



FRIDAY, APRIL 5.

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Contributions.

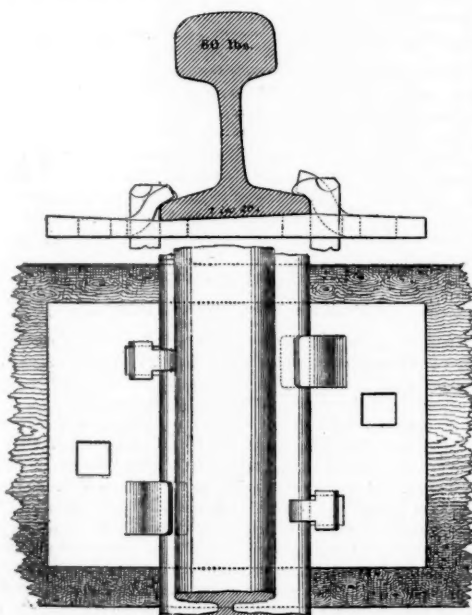
The Elastic Tie Plate.

19 GREAT GEORGE STREET,
LONDON, S. W., March 23, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Seeing in your issue of March 8 an illustration of a base-plate, supposed to be taken from my paper on "The Use of Heavier Rails," lately presented to the Institution of Civil Engineers here, I beg to say that it is an entire mistake, as can be seen by any one on reference to the drawing with the paper, and also to the volume of the Minutes and Proceedings of the same Institution just published, and I hope you will republish my design from these minutes, and allow space in your valuable columns for the following corrections. Your readers would otherwise think that this is the base-plate that I propose and have suggested for use on Swedish and other railways. This I deny, and would not by any means have my name connected with such a design as the one you have illustrated, and of which a small lot is said to have been laid in 1883 on a private line in Sweden.

To tell the truth this base plate, as well as the stone sleeper, was offered to me for trial by the inventor in Sweden, a Mr. Schauman, in 1883, but I declined for obvious reasons. I need not here give my reasons for so doing, but I hope that my professional standing is too well known to your readers for them to think that



Tie Plate Proposed by Mr. C. P. Sandberg.

I should be associated with such a scheme, and in justice to the railways in Sweden for which I have been for the last twenty years, and still am, Consulting and Inspecting Engineer, I should not like it to be supposed that they entertained such a proposal, for such a supposition would seriously mislead your readers in America.

Something of the same description is now largely made in England for South American railways, but there is no elasticity about it, which seems to be the subject of the patent in this design. I had it all under consideration while designing the proposed base plate published in my paper, but as for patents I take this opportunity to state that I never had any

connection with patents of any description, as it would have interfered too much with my independence as a professional consulting engineer. Whenever I arrived at a conclusion from practical experience that anything good could be introduced to the benefit of producers and consumers of railway plant, I published it openly for any one to adopt; thus I have no material interest in pressing my design for rail section or base plates, and this has been my principle all through my professional life, and this is the case with the base plate now under notice. In this way I have not the slightest reason to oppose the schemes of others, and would gladly see the best adopted; but I could not allow your readers to imagine that the illustration in yours of March 8 is the base plate I proposed and published in my paper. Should this be adopted in America and prove a success, I should then have received credit for what does not belong to me had I not sent you this disclaimer.

C. P. SANDBERG.

[We reproduce the drawing of the tie-plate proposed by Mr. Sandberg, and regret that the one illustrated by us before should have been confounded with the design recommended by him. The promoter of the "elastic tie plate" is in no way responsible for that error. The plate shown here is designed to weigh 10 lbs. and Mr. Sandberg recommends a surface of 7 in. by 10 to 15 in. He suggests rolling the plate with an inclination of 1 in 20 in the rail seat for those who wish to have the rail canted inward.—EDITOR RAILROAD GAZETTE.]

Cylinder Condensation.

MARCH 1, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In speaking of cylinder condensation in your editorial of Feb 22, on "The Compound Locomotive," you quite ignore the influence of compression in raising the walls of the cylinder to a temperature almost or quite equal to that of the initial steam, and consequently your blizzard comparison cannot hold good. Even leaving compression out of the question, the cylinder walls of a fairly fast-running engine could not be brought to the same temperature as the contained exhaust steam, unless they were of an impracticable thickness, say $\frac{1}{16}$ in., as the metal, when once thoroughly heated, cannot possibly give up its heat with the facility your remarks would imply, and must, therefore, exercise a very considerable influence on the range of temperature. My opinion that cylinder condensation is not the tremendous evil it is so usual to picture it is borne out by the fact that Rankine, in his great work on the steam engine, passes the subject by with but little attention; and I am convinced that the rise in the expansion curve of indicator diagrams, generally attributed to the re-evaporation of condensed steam, is caused by leaky valves, and by no other cause. It by no means follows that a valve which seems tight when stationary must necessarily be tight when in motion.

An objection against the Webb type of compound engine is the extra amount of machinery required for the third cylinder, which together with the cost of keeping it in repair, and the oil used for lubrication, forms an item which cannot be despised. A condition which seems bound to arise occasionally in practice, and would constitute a very valid objection to the type, is that if a Webb engine were to stop with the low pressure crank pin on a dead centre the two high pressure engines would be insufficient to start a heavy train, and until the wheels were pinched round little motion could take place. It is possible, though, that by taking the slack of the train the difficulty might be overcome.

It would seem that compound engines need hardly be employed in this country as a last resort for steam saving and fuel economy, until we have exhausted every means at our disposal to increase the efficiency of the ordinary type, which even the warmest advocates of the compound system cannot seriously claim has been done.

Have you overlooked the cards given by a four-valve cylinder locomotive, the Strong, when running on the Northern Pacific, and published in the *Railroad Gazette* some months ago, when you say the indicator card you give as the ideal for single expansion engines has not been approached at speeds of 50 miles per hour?

[Regarding the action of the Webb compound locomotive, our correspondent raises the usual objection which is made to that style of engine when used to start heavy trains. While it is evident that under the condition which our correspondent mentions the locomotive has a minimum power, yet the exact amount of this power is difficult to state until trials are actually made. It is reported on English authority, that is not uncommon to use a pinch bar to get the engine off a "dead centre." This is attended to by the engineer before he is ready to start the train, and no delays are caused thereby. The American engine can readily start our trains, but it cannot fully utilize its adhesive weight at high speeds. This last, we are told, the English engine can do; and, if so, the American locomotive designer will have an opportunity to show his "Yankee" ingenuity in originating a machine which will combine the good qualities of both. Regarding the indicator cards, we think, if our correspondent will make a careful comparison of the two illustrations to which he refers, he will find our position correct. Further reference to the subject matter of this communication will be found in the editorial columns.—EDITOR RAILROAD GAZETTE.]

Per Diem Car Service.

TO THE EDITOR OF THE RAILROAD GAZETTE:

One of the notable facts in the world's history is that, in nearly all reforms undertaken there have been those who would swing, pendulum-like, from one extreme to the other. The suggestion which has been offered by different gentlemen that the system of car service settlements should be reformed by a single step from the present straight mileage system to a straight per diem system exemplifies this old truth, and reference to the article of Mr. Edmund Yardley, in the *Railroad Gazette* of March 15, will confirm my statement. This article purports to show the equitableness of straight per diem in contradistinction to combined mileage and per diem. It makes the point, and I concede it, that if B pays 25 cents per day for the use of cars and receives a like amount for his cars the payments are equal. This is a self-evident truth. But when it comes to the proposition that because it is a truth it would be fair and just to all concerned to step directly from straight mileage to straight per diem, the matter assumes altogether a different aspect. I submit that the practical solution of the matter of equity between the two systems hinges on the question of the extent of the gains to be enjoyed and the losses to be borne by the respective companies subscribing to the plan; and, after all, that the most equitable system is the one that will accomplish reform with the maximum of gain and the minimum of loss.

So far as I know, the straight mileage system is the only system that has ever been generally used in this country, and therefore the results obtained under that system become the basis of comparison with results to be obtained under any other proposed system. What, then, does such a comparison show? Nothing more nor less than that 30 roads, out of a total of 47, covered by the statistics collected through the Car Accountants' Association, would gain in one year, under straight per diem, about \$1,500,000. For every gain there must be a corresponding loss. Does it not follow then, in view of the fact that the acceptance or rejection of any reform system of car service is to a certain extent optional with the different roads, that this very large benefit to be enjoyed by certain roads at the expense of others, becomes the most important factor when considering the introduction of the straight per diem system? As the introduction of any system must precede the reforms it would inaugurate, it might be well at this time to consider the probability of straight per diem meeting with sufficient favor to even approach general introduction.

The efficient car borrowers, that is, the roads which pay under the present straight mileage system 25 cents or more per car per day, which Mr. Yardley refers to and appears to be most interested in, are not practically a factor in the consideration of the question in this aspect, as they would of course not object to the straight per diem plan. For instance, there are 16 such roads included in the Car Accountants' statement, which in the aggregate would gain \$188,000 per month. Besides, such roads may be said to have already attained the measure of reform; they have got their car service on a paying basis. But how about the roads that do not show a service of 25 cents per day, and which are the real factors when we would consider the general application of the system?

Take the Philadelphia & Reading, which fairly represents that large number of roads (in fact the great majority) which do not under present conditions obtain a car movement that will average 25 cents per day. Why did it withdraw from the combined plan last year? If its officers are correctly reported, and there seems no doubt of it, simply because the losses as compared with the old plan were very heavy. Its loss under the $\frac{1}{2}$ cent per mile and 15 cents per day rate was about \$7,500 per month. Under straight per diem the loss would have been still greater—about \$9,000 per month. Under the proposed rate of $\frac{1}{2}$ cent per mile and 10 cents per day that road's loss would have been only \$4,000 per month. The Reading worked the combined system only four months and was the first to cry, enough! Was not that cry the immediate cause of the dissatisfaction that soon followed? It was heard not only directly in the per diem ranks but by influence, with many other roads which had the scheme under contemplation. In four months the Reading lost, say \$30,000. Now if the rate had been $\frac{1}{2}$ cent per mile and 10 cents per day could not this road have worked the system just twice as long with the same or less loss? Here then is the sequel: The actual loss under the per diem plan to the Reading for February (see proceedings October meeting Time Convention) was \$15,059. For April it was \$9,030. At this rate of decrease for four months longer the road would have reached a basis, through the improvement of the service, whereby it could have continued to operate the system without loss. It should be remembered that the abuses which contribute to inefficient car service are the accumulation of years and cannot be neutralized in a day. It takes time, and months of it too. The objection to straight per diem is that it at once saddles on the roads not now giving adequate service a great loss of money, which appears as a penalty for undertaking the reform. The combined plan at $\frac{1}{2}$ cent per mile and 10 cents per day is not burdened with this objectionable feature, for while the rate about equals the present $\frac{1}{2}$ cent rate on a performance bringing 25 cents per day, it so graduates the loss that it will not be a burden to any, and holds out to all car borrowers the opportunity of changing loss into gain, and by the doing of it the reform will have been accomplished. This brings me to my point; that as the co-operation of the roads not now returning 25 cents per car per day is essential to the introduction of any reform, that system which will admit of their co-operation at

the least loss, and still be fair to the car owner, is the most equitable, and includes more elements of fairness than any other. These premises show that this system is not the one advocated by Mr. Yardley.

Take a glance at the other side of the question, Mr. Yardley's side. The roads which suffer under existing conditions are the car owners; those which have an equipment sufficient to the demands of their own traffic, but through the unreasonable detention of this equipment on other roads are deprived of its service. These are the roads which straight per diem, it is supposed, will relieve. But how would they actually fare?

The "car borrowers" may be divided into two classes, those who borrow cars for transportation purposes and those who borrow for storage or warehouse purposes. The Car Accountants' statistics show as follows:

Transportation Borrowers.

Ten roads whose equipments show a performance of only 7,924,451 miles on all other roads, but whose traffic required a performance of 16,069,287 miles by foreign cars, and for which they paid an average of 28.2 cents per car per day, show as follows:

	Days.	Miles.
Service of cars on other roads.....	333,390	7,924,451
Average.....	22.4 miles per day.	
Service of foreign cars on roads cited.....	427,917	16,069,287
Average.....	37.6 miles per day.	

Debit balances: Under straight mileage, \$61,086; under combined, $\frac{1}{2}$ c. and 10c., \$48,180; under straight per diem, 25c., \$8,639.

Storage Borrowers.

Eight roads, whose equipments show a performance of 4,618,931 miles on other lines, but whose traffic required a performance of 6,111,400 miles by foreign cars, and for which they paid 15.3 cents per car per day, show as follows:

	Days.	Miles.
Service of cars on other roads.....	146,206	4,618,931
Average.....	31.6 miles per day.	
Service of foreign cars on roads cited.....	290,168	6,111,400
Average.....	29.4 miles per day.	

Debit balances: Under straight mileage, \$11,194; under combined $\frac{1}{2}$ c. and 10c., \$22,759; under straight per diem, 25c., \$38,240.

These figures sustain Mr. Yardley's assertion that

"Whenever the average miles per day of foreign cars on the borrowing road is greater than the average miles per day of its cars on foreign lines, then it is to the interest of such a road to have a straight per diem charge, *vice versa*, when the average miles per day of such cars is less on its line than its cars make on foreign roads, then the mixed plan will be the more favorable for it."

But, do the figures prove that straight per diem is a just system? Look first at the service obtained by "transportation borrowers" and say if payment on that basis would be just to owners of the cars? What amount represents the value of the car to the borrowers? Is it not the performance of the car rather than an arbitrary amount, and is not a system which provides for a fixed charge to cover interest on investment plus a charge commensurate with the service performed just to both owner and borrower? What, then, as to the "storage borrowers"? It will be seen from the figures above that the proposed combined system will double the expense to these roads. Is any greater penalty for detention necessary to produce better service? When a road's business requires a performance of 6,111,400 miles, at a net cost of \$22,759, one-half of its gross expense having been due to detention of cars, will the natural result not be immediate action toward the reduction of such expense? As the only way it can be done is through quicker movement (decreased detention), is not the outcome the accomplishment of reform? What straight per diem might do is a matter of conjecture, but that the combined system will increase the movement of cars is a reality. (See October proceedings Time Convention.)

Another class of roads are those over which cars make an entire trip in a day, of which there is a very considerable number. To many such, 25 cents for each trip would be unjust, while if there were no charge at all it would be unjust to owners. In other cases, where the performance of cars is considered, the 25 cent arbitrary rate would not be just to owners. For instance, take the Fall Brook Coal Co., July, 1888, where a performance of 60 miles per car per day was made. Cost under straight mileage, \$18,309; combined, \$16,274; straight per diem, \$10,170, a reduction of compensation to owners for use and wear and tear of 44 per cent. This is good for the borrower, but how about justice to owner? Is this not too large a premium to place on prompt movement? Is not 11 per cent., secured under the combined plan, sufficient?

The figures just quoted prove the inaccuracy of Mr. Yardley's inference that under the combined plan a penalty is "imposed upon a road that runs cars fast and delays them little."

Mr. Yardley asks the committee to hesitate about "recommending a plan which, in a trial of eleven months last year, developed so few elements of popularity and made so few friends." Is not this, in view of the actual recommendation of the committee, somewhat inconsistent? In April, 1888, the committee submitted to the Time Convention the views of 79 roads on the adoption of the $\frac{1}{2}$ cent and 15 cent rate. (See Proceedings Time Convention, April, 1888.) Forty-five roads were ready to adopt the plan; 24 said "no;" five said "not yet;" and five "not ready." The significant fact about these replies is that the 45 roads answering "yes" own or control 372,623 cars, or nearly one-half of all the cars owned in the United States. Four roads, owning 35,904 cars, signified their preference

for a straight per diem system. The large car owners were shown by these replies to be in favor of the combined plan. The question that seems to have confronted the committee was how to get the car borrowers into line. The only plausible reason for their not coming in was the increased cost. To meet this objection the rate is lowered, and as the recommendation takes away to a great extent the objectionable features of the plan which Mr. Yardley says made so few friends, I hardly see the appropriateness of his inference. Your editorial notice of his criticism as to the position of the committee on the long haul business is to the point. It is not necessarily the long lines but the long haul lines that will be benefited by straight per diem. It may be, and is altogether probable, that the larger percentage of the business of the long lines he refers to is short haul local business. His criticism on this point, however, is in keeping with his whole article, which starts out by objecting to the recommended plan of $\frac{1}{2}$ cent per mile and ten cents per day, and then using the $\frac{1}{2}$ cent per mile and fifteen cents per day rate as the basis of his comparisons. W. G. WATSON.

Side Chute Hopper Car—Union Pacific Railroad.

The accompanying illustration shows a very interesting side chute hopper car in use on the Union Pacific. This illustration is of particular value on account of its completeness of detail. This car is lined throughout with metal and fitted with air brakes, and is designed for the heaviest service in construction and ore transportation. The general dimensions of this car are as follows:

Length of car out to out of end sills.....	32 ft. 1½ in.
Width of car out to out of side sills.....	8 ft. 4 in.
Length inside of car at top.....	22 ft. 5 in.
Width inside of car at top.....	7 ft. 10½ in.
Length over side chute frames.....	13 ft. 10½ in.
Length inside of side chutes.....	6 ft. ¾ in.
Angle of end chute.....	40
Angle of side chute.....	45
Top of sill to top of side planks.....	3 ft.
Length of car over buffer blocks.....	33 ft. 1½ in.
Extreme length of car over draw-bars.....	34 ft. 8 in.
Top of rail to top of floor (car light).....	4 ft. ¾ in.
Top of rail to top of side planks (car light).....	7 ft. 3 in.
Top of rail to top of brake wheel (car light).....	7 ft. 2½ in.
Total wheel base of car.....	27 ft. 8½ in.
Rigid wheel base of trucks.....	4 ft. 11 in.
Door opening of chute.....	2 ft. ¾ in. by 6 ft. ¾ in.

The longitudinal sills are four in number, two side and two centre sills. The two side sills are shown at BB, the two centre sills are shown at AA; figs. 2 and 4. The dimensions of the details are too clearly shown in the illustration to need further mention.

Fig. 1 is a half side and half sectional elevation showing the hopper and hopper doors.

Fig. 2 is a half top view and half sectional plan showing the interior of the hopper and the framing of the sills.

Fig. 3 is an end view showing one hopper opened and all the attachments thereto.

Fig. 4 is a section through the middle of the car, transversely, showing one hopper closed and the other removed.

Fig. 5 is an exterior view of the hopper doors, showing in detail all the connections for operation.

Some of the elements of the construction of this car which are useful to those who may desire to design similar cars, but which are not shown in the illustration, may be given as follows:

The side and centre sills are framed to end sills by double tenons 1½ in. long. Distance sills and blocks framed to side and centre sills; and auxiliary sills to distance and end sills by double tenons 1½ in. long. Each sill is secured at the ends to end sills by two ¾ in. joint bolts. The side sills are let into the end sills ½ in. Four ¾ in. cross rods tie the distance and longitudinal sills together.

The inclined floor timbers rest at the lower end on distance sills, and are tenoned into needle beams. They are carried at upper end on the frame. A ridge piece 6 in. by 8 in. extends longitudinally through the centre of the car to the outside of the end inclined frame, and rests on three saddle blocks as shown.

The side incline chute is made up of two corner posts 4 by 4 in. at each end of the chute, framed into the outside needle beam at top and side incline floor sill at bottom, and also of one centre post on each side 4 by 6 in., framed into centre needle beam at top and end incline floor sill at bottom. On each side of the chute two side incline floor timbers are tenoned in side braces, and the whole construction is supported by a wrought-iron strap ¾ in. by 3 in., fastened around the bottom and sides of the chute and secured at the under side sill by two ¾ in. lag bolts, and also by two ¾ in. rods running through the sill and side planks, secured on the wrought-iron strap above the same. The side chute is also held in position by a ¾ in. rod; this rod is secured at the lower end, as shown, on a cast-iron washer, which also ties the side chute sill and centre brace timbers.

The doors are of yellow or Norway pine, 2½ in. thick, 2 ft. wide by 6 ft. long, made of two planks dressed on the outside faces, jointed at edges, and tied together by three wrought-iron hinge-straps for each door. The doors are made in two sections on each side, hinged at DDD as shown in fig. 5. The hinge-pin consists of a 1½ in. rod shown at E running through all the hinges on each door. This rod is supported by hinge-straps, ¾ in. by 3 in. wrought-iron, secured to side sills by three ¾ in. bolts each. Doors covered on inside with No. 8 A. W. G. sheet iron, held in place by ¾ in. carriage bolts and also by the hinge-bolts. Each door is secured by two latches, one at each end, and by a fastening at the centre.

On each side of the car a 1½ in. latch-shaft rests in four cast-iron bearings, held to sill by ¾ in. U bolts; this shaft, shown at FF, runs the whole length of the car and is support-

ed by bearings GGG; the shaft has four arms on each side as shown at HH from which rods II connect to each end of each door; the latch-shaft is squared to receive a wrench, by means of which the latches are operated. There is one holder for each chute door to keep the door open when desired.

All bolts which secure the iron to the side planks and doors have the nuts outside of car, the heads of all screws and nails are set in flush.

The material of which this car is constructed is principally as follows:

Two side sills (Norway or yellow pine) 5½ in. by 1 ft. by 31 ft. 4 in.	
Two centre sills (Norway or yellow pine) 5½ in. by 1 ft. by 31 ft. 3 in.	
Four auxiliary sills (Norway or yellow pine) 5 in. by 1 ft. by 7 ft. 3 in.	
Two distance blocks (Norway or yellow pine) 5½ in. by 1 ft. by 1 ft.	
Four distance sills (Norway or yellow pine) 5½ in. by 1 ft. by 3 ft. 1 in.	
Two end sills (white oak) 7 in. by 1 ft. by 8 ft. 9 in.	
Two buffer blocks (white oak) 5½ in. by 8 in. by 2 ft. by 4 in.	
One needle beam (white oak) 6 b 8 in. by 8 ft. 4 in.	
Two needle beam (white oak) 4 by 9 in. by 8 ft. 4 in.	
Four draw timbers (white oak) 5 by 7½ in. by 9 ft. 3 in.	
Three saddle blocks (white oak) 5 in. by 1 ft. by 1 ft. 8½ in.	

One ridge piece (Norway or yellow pine) 6 in. by 8 in. by 22 ft. 3½ in.	
Two side incline floor timbers (white oak) 4 in. by 5 in. by 13 ft. 10½ in.	
Four side incline floor timbers (white oak) 4 in. by 4 in. by 6 ft. 6½ in.	
Two side chute chills (white oak) 4 in. by 6 in. by 15 ft. 10½ in.	
Two side chute centre posts (white oak) 4 in. by 6 in. by 1 ft. 5½ in.	
Two side chute centre braces (white oak) 4 in. by 6 in. by 2 ft. 7½ in.	
Four side chute corner posts (white oak) 4 in. by 4 in. by 1 ft. 5½ in.	
Four side chute corner braces (white oak) 4 in. by 4 in. by 2 ft. 7½ in.	
Four end incline floor timbers (white oak) 4 in. by 6 in. by 6 ft. 2 in.	
Eight end incline floor timbers (white oak) 4 in. by 4 in. by 6 ft. 2 in.	
Two end inclined frame cross timbers (white oak) 4 in. by 5 in. by 7 ft. 10½ in.	
Two end inclined frame cross timbers (white oak) 4 in. by 4 in. by 7 ft. 10½ in.	
Eight end incline frame posts (white oak), 4 in. by 4 in. by 1 ft. 9 in.	
Four end incline frame braces (white oak), 4 in. by 4 in. by 2 ft. 11 in.	
Eight door planks (Norway or yellow pine) 2½ in. by 1 ft. by 6 ft.	
Four truss blocks (Norway or yellow pine) 5 in. by 8½ in. by 1 ft. 4½ in.	
Two center post brace blocks (Norway or yellow pine), 6 in. by 6 in. by 2 ft. ¾ in.	
Eight side stakes (white oak), 4 in. by 5 in. by 4 ft.	
Six side planks (Norway or yellow pine), 2½ in. by 1 ft. by 27 ft. 8½ in.	
Two centre posts (white oak), 6 in. by 6 in. by 3 ft. 11½ in.	

Four pieces for running boards (white oak), 1½ in. by 5 in. by 4 ft. 9½ in.	
Four pieces for running boards (white oak), 1½ in. by 5 in. by 4 ft. 1 in.	
Two pieces for running boards (white oak), 1½ in. by 5 in. by 8 ft. 8 in.	
Nine hundred and thirty-six feet flooring (Norway or yellow pine), 1½ in. by 6 in. to 8 in. wide.	

The weight of iron and brass used in the construction of this car and its trucks is as follows:

Cast iron.—Approximate weight, exclusive of wheels, 2,697 lbs.

Wrought iron.—Approximate weight, exclusive of axles, nails, screws, lag screws and carriage bolts 7,586 lbs.

Brass journal bearings, 72 lbs.

The trucks used under this car are the Union Pacific standard four wheel, of heavy design, the diameter of the wheels used is 33 in. and the weight of each wheel is 600 lbs. This wheel was illustrated in the *Railroad Gazette* of March 8, 1889. The method of attaching the air brakes to this design of car was shown in detail by a cut in our issue of March 1.

Chicago & Northwestern Rules.

The Chicago & Northwestern has issued a revised code of rules and regulations, which is to be put in effect May 1. The prefatory "General Notice" is identical with that of the Uniform Code, but beyond this the book may be called entirely original, there being little if any attempt to conform to the Time Convention standard in any respect. The arrangement is different, the numbers have no correspondence whatever, and many of the rules are fuller than those of the Uniform Code. The practice of the Northwestern will be considerably changed, the present practice being to use two short whistles to apply brakes, and one long and two short blasts for a highway crossing. The Uniform Code of Signals is to be followed, with certain exceptions noted below. It is stated that the hand signals have heretofore been quite at variance with that code. If this is so it is to be hoped that the change on May 1 will be a genuine change. It will thereby afford a sharp contrast to the way things are still done on some roads which ostensibly adopted the uniform signals several months ago.

"Each new time-table must be carefully studied, and all conductors, engineers and other trainmen must keep themselves supplied with a copy of the same and be prepared for an examination thereon." Red signals are employed for indicating that another section of a train is to follow, and the mischievous phrase "A train following must always be considered a part of the leading train" is embodied in the rule. A red flag is used to indicate caution where track is in bad condition—that is, where the engineer is not required to come to a full stop. On single track this caution flag is placed on the

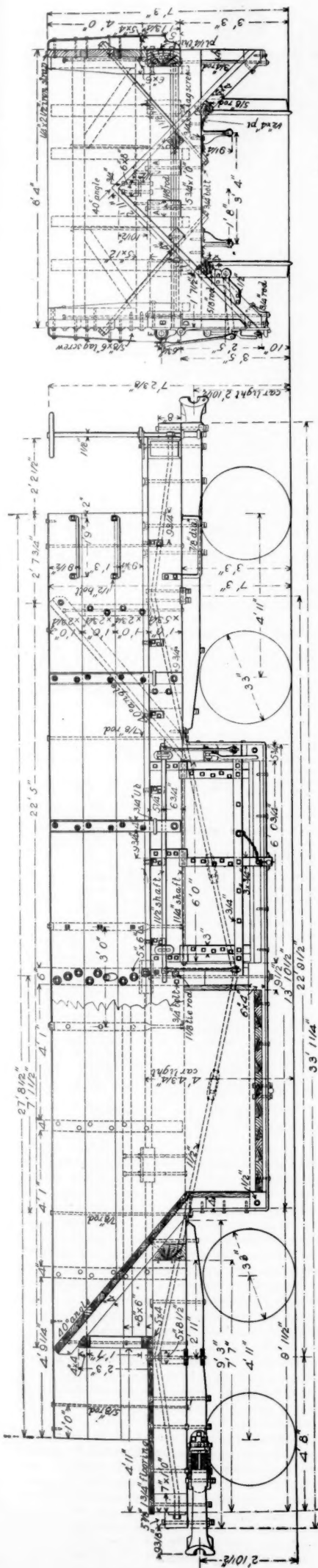


Fig. 1.

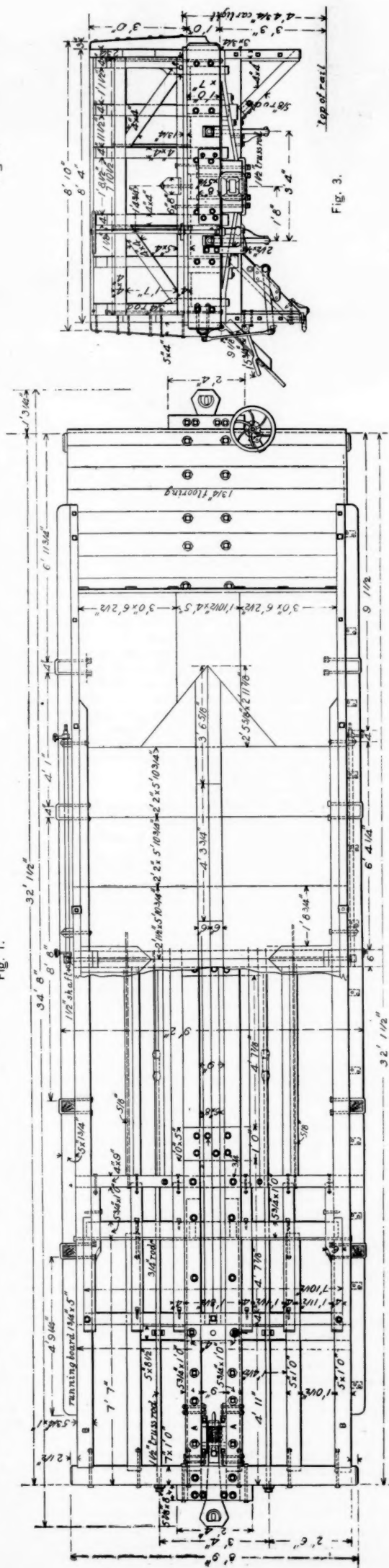


Fig. 2.

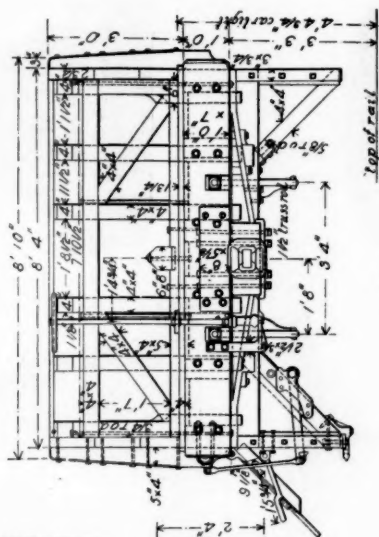


Fig. 3.

Fig. 4.

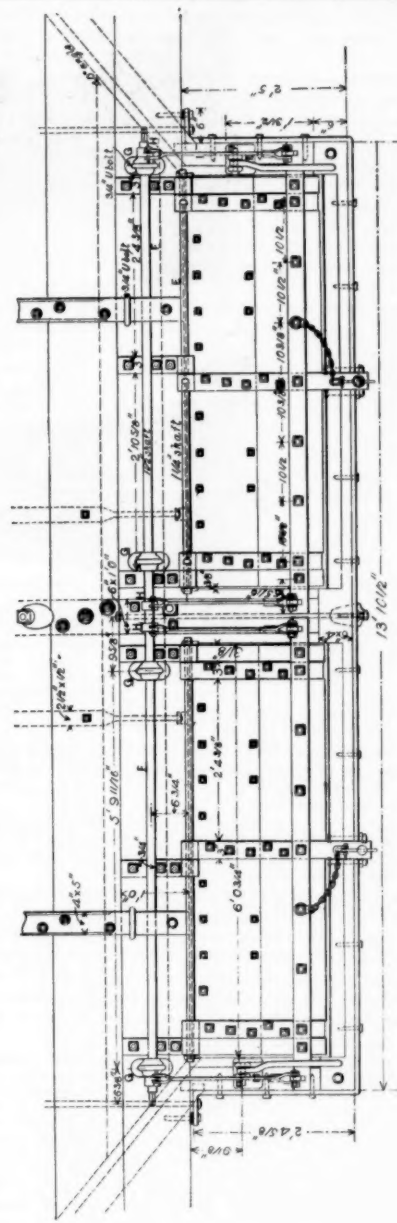


Fig. 5.

SIDE CHUTE HOPPER CAR—UNION PACIFIC RAILWAY.

engineer's side and on double track on the fireman's side of the track. Where there are two tracks this road runs its trains on the left; this arrangement of caution flags illustrates one of the disadvantages of that plan. Passenger trains at night are required to exhibit two red tail lights, and all other trains three. Two of these three are to be placed on the sides of the car, but the third may be either on the platform or in the cupola. Switch lamps show green when the switch is set for the main track. Four long blasts of the whistle calls in a flagman from either direction, there being only one signal for this purpose. The company has adopted the Parsons train indicator for use in the cupola of cabooses. Trains of more than one section are indicated by "1ST S," "2ND S," "LS" (last section), "SPL" indicates a special. Extra trains are flagged by carrying a white signal on regular trains. (These do not have the rights of the regular and have "EX" shown in the indicator.)

There is a quite full description of interlocking signals with illustrations of semaphores. The caution signal is painted blue, and shows a blue light. The 5-minute rule is of general application. That is to say, all trains, when held at a certain point until a certain time, must, without specific orders, wait 5 minutes beyond that time.

When trains meet by special order or time-table regulations the conductors and engineers must inform each other what train they are. This must be done by word of mouth, and not by any signal of hand or fingers.

Rule 108 reads as follows: "All sections moving under one time-table train number, possess all the time table rights possessed by that regular train number, but no more. Should a section of any regular train be delayed and unable to make the same meeting points as any advance section of the same train number, it has no right to follow the advance section to such meeting point regardless of a train having the right to the road; as in that case it would assume more rights than are possessed by the regular train." The section which is unable to make the meeting point must obey the rules, the same as though it were the first section.

Trains at stations are protected by the following: All freight, special and work trains, will pass into and through all regular stations, and will approach all isolated side tracks, and also all water-tanks and coal-sheds, with train under full control, expecting to find trains at such points. Speed must be reduced, engineers and trainmen must commence to get their train under control one mile from all such specified points, so that under no circumstances whatever shall it be possible for them to strike any train, car or engine that may be within the switches of any regular station, or that may be taking coal or water at any coal-shed or water-tank. The entire responsibility for safety rests upon the approaching train. When fog, darkness, or other circum-

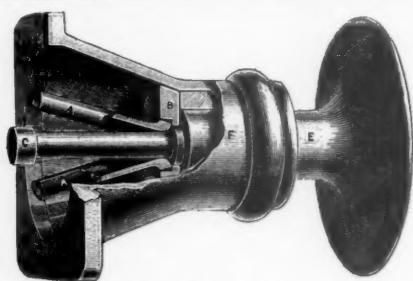


Fig. 1

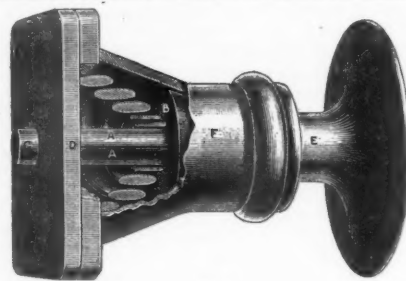


Fig. 2

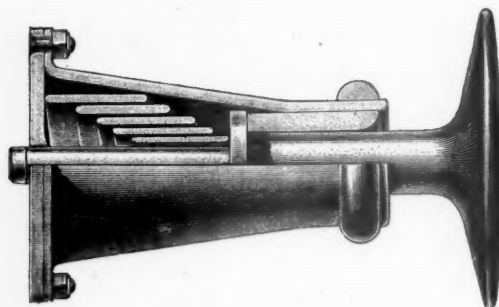


Fig. 3

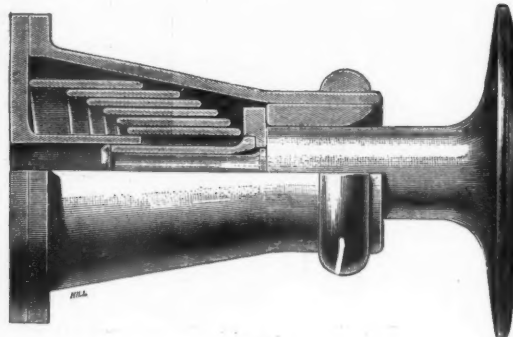


Fig. 4

TURTON'S IMPROVED CAR BUFFER.

stances render it necessary, trains occupying main track at stations, as an additional precaution, must protect themselves as per Rule No. 113.

Another good rule is:

Cars must never be backed at stations and in freight yards, or pushed ahead of an engine, unless there is a man on the forward car, or on the ground, ahead of the forward car, to see that the way is clear and to give signals.

Freight and special trains must not pass over any switch at a speed exceeding 10 miles an hour.

The rules for the movement of trains by telegraph are quite different from those of the Uniform Code. X is used for the same purpose that the Uniform uses O K, and O K signifies "complete." There is nothing requiring compliance with the duplicate order system, and some of the forms given are not in conformity to it. Rule 209 reads:

A freight train must not pass a telegraph office, whether train order signal is exhibited or not, until the conductor and engineer have received orders from the train dispatcher, or a release or clearance, as the case may require, from the operator. Conductors and engineers of passenger trains will observe the same rule at such telegraph offices as are regular stops for their train. Extra and special trains will observe the same rule as freight trains, but extra or special passenger trains are not required to make stops solely for this purpose. They will be governed in this respect the same as regular passenger trains. This does not relieve operators from promptly displaying red signals whenever they have orders, or making other necessary efforts to stop them.

When the train order signal is displayed, a train arriving which is not to be governed by it is given a *release*. When trainmen ask for orders, where a signal is not displayed, a *clearance* is given.

The rules for the guidance of employés in other matters than strictly train movements are quite full. Agents are instructed, among other things, to be particular about keeping posters and advertising matter off freight cars. They must promptly advise superintendents of occurrences in the neighborhood of general interest, such as fires, disasters, deaths of prominent persons, etc. Cutting a train in two or detaching the engine on approaching a station, but before it has been stopped, is forbidden. Cars loaded with machinery and other freight difficult for brakemen to pass over, must be placed in the middle of the train. Trainmen are carefully instructed about caring for live stock, and must in hot weather give shippers facilities for throwing water on hogs, the man in charge being required to decide for himself how much water is necessary. Elaborate instructions are given concerning the transportation of bonded freight and all goods which must go through the Custom House. There is a special chapter giving full instructions regarding the protection of trains during storms; and station agents, telegraph operators and train dispatchers are required to be constantly on the alert for emergencies of this kind. The rules for the use of the air brake are not nearly so full as those of the Northern Pacific, recently printed, but cover some points not mentioned in the latter. The tools to be carried on passenger cars, baggage cars, cabooses and engines are enumerated in a full list. The list for cabooses shows 37 items and 80 articles. Conductors are required to check up these articles on receiving a caboose and on leaving it at destination. The ordinances of the city of Chicago and the laws of six states, as well as those of the United States, affecting trainmen, are summarized at the close of the book.

An English Buffer.

Apocryph of a recent discussion by the Western Railway Club of the subject of draw gear and buffer stops, we publish illustrations of a spring buffer extensively used in England. We are indebted to the *Engineer* (London) for these cuts. The English freight cars are fitted, in nearly all cases, with spring buffers of this type; and recently several of the large roads have determined to refuse cars which are unprovided with efficient spring buffers. It has been found in the English service that far less repairs are necessary to the sills when suitable spring buffers are used.

The buffers shown in the illustrations are an improvement on the older forms of buffers, which could not be easily repaired. In this new form repairs are more easily made. The difficulty with the old buffer was to remove the spring without injury to the case. In this later device it is accomplished simply by removing the back plate D, when the spring, the half tubes A A, washer B, and plunger E can be withdrawn, as shown in fig. 1. When put together again the buffer is firm and compact. There being no screws, cotters, etc., in it, nothing can come loose; and should the spring at any time become injured so as to lose its resilience, the loose washer B cannot leave its proper position. No special tools are needed for liberating the parts of this buffer; it can be done at any time or in any place. In special cases, such as for locomotives, where it is necessary that the spindle should not pass through the buffer beam, the back plate is fitted with a sleeve or tube for a short spindle to slide into, as shown in fig. 4.

Notes from the Shops of the Toledo, Ann Arbor & North Michigan.

The shops of the Toledo, Ann Arbor & North Michigan are located at the junction of that road with the Detroit, Grand Haven & Milwaukee and the Saginaw Division of the Michigan Central. A little over a year since the management of the road decided to accept the inducements offered by the people of Owosso, and remove their shops from Toledo. The problem presented to Mr. A. Galloway, the Master Mechanic, was to convert a stump-covered strip of bottom land, 30 acres in extent, into a presentable location for round houses and shops, and to erect thereon suitable buildings, for a limited amount of money. That the appropriation has been judiciously expended none can doubt, for, though not so expensive as the shops of the giant roads and as yet unfinished, the Owosso shops are, as far as they go, thorough and complete.

The buildings are of brick, with the exception of the freight car erecting shop and paint shop. The machine shop, which has a capacity of six locomotives on three tracks, is 80 x 120 ft. Next to this is the blacksmith shop, 60 x 100 ft., in which are five fires. The power-house joins the latter on the east, being 40 ft. square, and about 300 ft. beyond stands the car erecting shop, designed to be 125 x 200 ft., but at present only half that length. The machinery for the wood working shop has just been ordered, and is expected within a few days. The new outfit will consist of the following: One Colburn saw table, 1 saw table after a design of Mr. Galloway, 2 wood planers, 3 saws, 1 Lomberry & Norton large size car mortiser and borer, 1 hand joiner, 1 Post drill tool grinder, and a swinging cut-off saw, made at Toledo.

With the arrival of this new machinery the work, which is now confined to repairs, will be extended to construction. The machine shop is also fitted up with new machinery, among which may be mentioned one 60-in. universal radial drill; one 24-in. Reed lathe; one 26 x 26 Gray planer; one single axle lathe; one 42-in. wheel borer and one 33-in. hydrostatic wheel press, by the Niles Tool Works; one double head "National" bolt cutter. The tools mentioned are in addition to those formerly used in the Toledo shops.

One feature of Mr. Galloway's plant which will interest railroad mechanics is the fuel which he uses in running his 50 H. P. engine. It is the "slack" from soft coal used on the engines, and consequently costs nothing beyond the handling. A locomotive boiler furnishes the steam.

A convenient system of testing Westinghouse brake pumps is in use. The pump is bolted up in the machine shop and tested before being placed on the locomotive. Mr. Galloway has also improvised a small sand drier, which he will allow brother mechanics to copy without royalty fees. It is not patented.

The roundhouse is worthy of mention. It is built on a 37

stall radius, that is 37 stalls, and one passage for main track will complete the circle, and has been completed to No. 12, inclusive.

Very little trouble is encountered with locomotive boiler scale, a compound being used successfully to prevent its formation; this in face of the fact that the water used contains much scale-producing matter.

Rules for Hauling Private Cars.

The Atlantic Coast Line and the Plant system of railroads have issued to parties interested the following joint announcement of the regulations that they have adopted for the guidance of their officers in accepting and hauling private passenger cars:

The applications made last winter for the transportation of private cars over our lines were so frequent that we have found it advisable to print our regulations on this subject for the information of those interested.

1. We ask that no request be made upon us for free transportation of a private car, unless it is to be used by officers of railroad companies which exchange annual passes with us. Or, we will transport cars at the request of a President, Vice-President, Receiver, General Manager or Superintendent of any railroad with which we exchange courtesies, on condition that each occupant of same be provided with an annual or other pass or a first-class ticket for each railroad over which the car is transported. See rule of Pennsylvania R. R.

2. When called upon to transport private cars other than as above, we shall endeavor to comply with the request on the usual condition, which is that the compensation for same shall be eighteen first-class fares.

3. We will not take private cars on any train in excess of the number of cars to which such train is limited; nor will we receive a car unless it is equipped at both ends with Janney couplers.

4. We will not undertake to transport a private car brought to us by a connecting line, except on at least 24 hours' previous notice.

Our experience of last season has shown the necessity of some clearly defined regulations about this matter, and we ask that our railroad friends will not consider that we are reluctant to haul their cars. We are glad to have them visit us. We only desire to restrict the privilege to those who are in a position to reciprocate, and are disposed to do so. This seems to us the principle that should govern such matters.

Universal Milling Machine Attachment.

A variety of positions in which a new attachment for milling machines can be used is shown in the accompanying illustration. Nothing is more essential to the economical operation of the modern railroad or locomotive shop than the introduction and intelligent use of milling machines, and the manner of use shown in the illustration will suggest many other ways in which the device can be employed.

This attachment consists of a short hollow shaft, mounted in bronze bearings, upon which is a bevel gear which receives motion from another bevel gear, mounted on the spindle of the milling machine. The bearings of the hollow shaft are integral with the head, which is shown in the shaded portion of the cut. This head is attached directly to the head-stock of the milling machine by four bolts. The bevel gear, driven by the milling machine, is attached to a spindle which fits a socket in the spindle of the milling machine. A key in the spindle prevents rotation. The auxiliary swivel shaft can be easily removed for repairs by taking out two clamp screws in the clamp bearings.

This attachment can be used either vertically, horizontally or at any angle, as shown in the cuts. The base of the device is graduated to facilitate the location of the auxiliary shaft at any desired angle. By mounting on this auxiliary spindle milling cutters of the proper shape, spur or bevel gears having epicycloidal, hypocycloidal or involute teeth can be milled, even where the base of the space between the teeth is wider than at the pitch line. This is accomplished in the same manner as with the celebrated "Corliss" gear cutter.

Referring to the illustration, the arrangement shown at A indicates a method of cutting angle cutters and bevel gears; at B milling of locomotive quadrants, or ratchets for sand

rod damper and injector handles. When the auxiliary shaft is in the position shown at C, the device can be used in a manner similar to the horizontal boring mill, or as a horizontal drill. By placing the auxiliary shaft at the angle shown at D, the recess for babbitt in locomotive cross head wings can be dovetailed to retain the babbitt. A most useful application of this device is shown at E, which represents the throttle lever in position, being milled for the various attachments.

There are several small details upon locomotives and many details in the locomotive shop tool room which require hand work, such as can be done by this device in connection with the clamp vise, shown at F. This clamp vise is arranged to swing at any angle. It has a graduated base plate, and is held in position on the trunnion by two nuts, which clamp the body together, as seen in the cut. The graduated arc on the trunnion shows the angle at which the vise is set. The jaws are hardened steel, 8 in. in length and open 5 in. The small pieces which make up the throttle and reverse lever and link motion, as well as the plates and keys in connecting rods, often require a class of work known as shaping or "jig" planing. It is to meet the demands of this class of work that this useful milling attachment has been designed, together with the clamp vise to be operated together, as shown at G. Not only is this device useful in large shops having a great variety of work, but in small shops as well, where the number of tools is limited; there are also a multitude of uses, other than those shown, to which this attachment can be put.

The manufacturers of this attachment are Messrs. Pedrick & Ayer, of Philadelphia, whose large variety of milling machines and special tools for railroad shops we have from time to time illustrated.

A Remarkable Run by the "Darwin."

On Monday, April 1, at 9:24 $\frac{1}{2}$ a. m., the "A. G. Darwin, No. 1," left Jersey City to make a continuous trip to Buffalo, a distance of 424 miles, with the Erie day express, No. 1. The run is usually made in four engine divisions. The train consisted of 6 cars and one Pullman coach on starting, and the gross weight, including engine and tender, was about 300 tons.

The run from Jersey City to Port Jervis (Eastern Division), a distance of 88 miles, was made, less total time of stops, in 2 hours 21 $\frac{1}{2}$ minutes, an average speed in motion of 37 $\frac{1}{2}$ miles an hour. On this division there are some steep grades which were made in good time, viz., New Hawthorn to Ramsey's, 7 mile, 42 ft. per mile, up grade, in 11 $\frac{1}{2}$ minutes; Hampton to Howell, 7 mile, average of 55 ft. per mile, up grade, in 10 minutes. The total lost time made up on this division was 11 $\frac{1}{2}$ minutes.

At Port Jervis another Pullman was attached, making 7 cars in all, and a gross weight of about 340 tons. The run from Port Jervis to Susquehanna (Delaware Division), a distance of 104 miles, was made, less total time of stops, in 2 hours 29 $\frac{1}{2}$ minutes, an average speed of 42 miles an hour. The distance is almost all up grade except from Summit to Susquehanna, which is a 60-ft. per mile down grade. A good deal of time was made up on this grade; steam was used much of the way and the speed was very near 60 miles an hour. The lost time made up on this division amounted to 17 $\frac{1}{2}$ minutes. Near Callicoon, 48 miles from Port Jervis, the train was delayed 15 minutes by a disabled freight train.

The Susquehanna Division from Susquehanna to Hornellsville, a distance of 140 miles, was made, less the total time of stops, in 3 hours 10 minutes; an average speed of 44 $\frac{1}{2}$ miles an hour. The same number of cars was carried as far as Elmira, where two more were added, making nine cars in all; a gross weight, including engine and tender, of about 400 tons. This division is quite level and the best running speed was made upon it, 19 $\frac{1}{2}$ minutes lost time being made up.

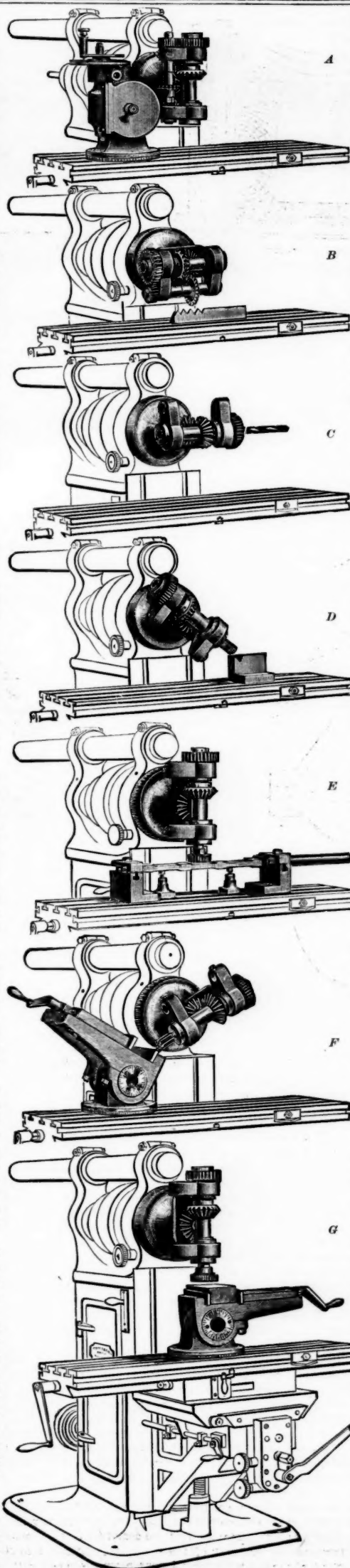
On the last division (Buffalo Division), from Hornellsville to Buffalo, a distance of 92 miles, the run was made, less total time of stops, in 2 hours 8 $\frac{1}{2}$ minutes, an average speed of 43 miles per hour. Two cars were dropped at Hornellsville and the train was composed of one baggage car, three passenger cars and three Pullmans, a total of seven cars and a gross weight of about 345 tons including engine and tender. The lost time made up on this run was 25 $\frac{1}{2}$ minutes. This division has several grades descending westward upon which very fast speed was kept. The most important of these is a 6 mile, 36-ft. grade, from Darien to Alden.

At Warsaw, 48 miles from Buffalo, there was a slight delay from a hot box on the rear tender truck, but otherwise the bearings gave no trouble at all, and the engine was perfectly cool on arriving at Buffalo, four minutes ahead of schedule time.

Coal was taken five times in the whole trip, and much delay was occasioned in doing so, as the locomotive had to leave the train to coal at the stations where engines are usually exchanged. The total lost time made up from Jersey City to Buffalo was 1 hour 14 $\frac{1}{2}$ minutes. This included the delay by the freight train mentioned above and the extra time of coaling. There was a continuous light rain all day and the rails were consequently very slippery. Mr. Geo. S. Strong, was on the engine most of the time and watched the firing carefully. A special car was attached all the way, carrying press representatives and a few railroad men to witness the test of endurance.

On Tuesday, April 2, at 9.15 a. m., the same locomotive left Buffalo on her return trip apparently in as good condition as when she left Jersey City. There were eight cars in the train, viz.: two baggage cars, three passenger and three Pullman, a gross weight, including engine and tender, of about 375 tons.

The run from Buffalo to Hornellsville, a distance of 92



Various Uses of a New Universal Milling Machine. Attachment.

miles, was made, less total time of stops, in 2 hours 35 $\frac{1}{2}$ minutes, a speed of about 36 miles per hour. The lost time made up was 3 $\frac{1}{2}$ minutes. The same run going west was made in 2 hours 8 $\frac{1}{2}$ minutes.

On the Susquehanna Division from Hornellsville to Susquehanna, a distance of 140 miles, the run was made in 3 hours 20 minutes, ten minutes longer than when going west. The train was heavier on this division, as two sleepers and one passenger car were attached at Hornellsville, making 11 in all, of which five were Pullman cars. A lost time of 20 $\frac{1}{2}$ minutes was also made up, and the train arrived at Susquehanna two minutes ahead of schedule time. One sleeper and one passenger coach were dropped at Elmira, 58 miles from Hornellsville, leaving nine cars which were taken through to Jersey City.

From Susquehanna to Port Jervis, 104 miles, the run was made in 2 hours 41 minutes, 9 minutes lost time being made up. On this division, from Susquehanna to Summit, is the 8 mile, 60 ft. grade mentioned above, and this was run in 23 $\frac{1}{2}$ minutes.

On the last run (Eastern Division), Port Jervis to Jersey City, 88 miles, the time was 2 hours 24 minutes, about 36 $\frac{1}{2}$ miles per hour; 8 $\frac{1}{2}$ minutes lost time was made up, the train arriving exactly on time. The lost time made up on the whole return trip was 32 minutes, there having been no serious delays from traffic. On this run also there was a drizzling rain the first half of the day.

Association of American Railway Accounting Officers.

The meeting of Accounting Officers, held at Chicago, March 20, to consider the subject of the settlement of joint through freight accounts, was well attended by the men of that region. Mr. C. I. Sturgis (C., B. & Q.) was Chairman, and Mr. C. G. Phillips, Secretary of the Association, acted as Secretary of the meeting. After full and free discussion, the following report was agreed upon for presentation to the General Convention, to be held at Niagara Falls in July next, as a basis for the settlement of joint freight accounts, viz.:

1st. The accounting department of the forwarding road will send daily to the accounting department of each line over which the way-bill passes, a legible impression or hand copy of each joint way-bill issued from any station on its line. These copies are to be forwarded by the accounting department in order to insure complete returns.

2d. The accounting department of the road which makes a correction upon a joint way-bill will promptly send a correction sheet to the accounting department of each road over which the way-bill is routed. All accepted correction sheets will be retained by the road receiving the same. In case of the withdrawal of a correction sheet the accounting department of the road which issued same will notify the accounting department of each road interested.

3d. The accounting department of the forwarding road will furnish the accounting department of the receiving road, on or before the 13th day of each month with an abstract of all way-bills from stations on its line, dated in the previous month, taking into consideration all corrections reported up to date.

4th. The accounting department of the receiving road will check and verify the forwarded abstracts, making such corrections upon the same as may be necessary, and then return same to the accounting department of the forwarding road on or before the 23d of each month, accompanied by a division sheet showing each road's proportion of the through earnings and balance due; and where more than two roads are interested the accounting department of the receiving road will also furnish the intermediate line or lines with copies of the abstracts as corrected, together with copies of the division sheets.

5th. The abstracts and division sheets rendered as above shall constitute the basis of settlement.

6th. The receiving road will pay any intermediate road its proportion as shown to be due by the abstract and division sheets rendered by it and settle with the forwarding road upon balances, drafts to be made on or before the 25th of the month.

7th. The receiving road will pay the intermediate roads their proportion of the through earnings, regardless of whether freight charges are prepaid or not; it being understood that prepaid amounts will be included in the settlement between the forwarding and receiving roads.

8th. Way-bills received too late to be taken into account by the receiving road will be included in the next month's account, it being understood that the receiving road will use every endeavor to locate and report in the current month all way-bills embraced in the abstract rendered by the forwarding road as provided in section 3.

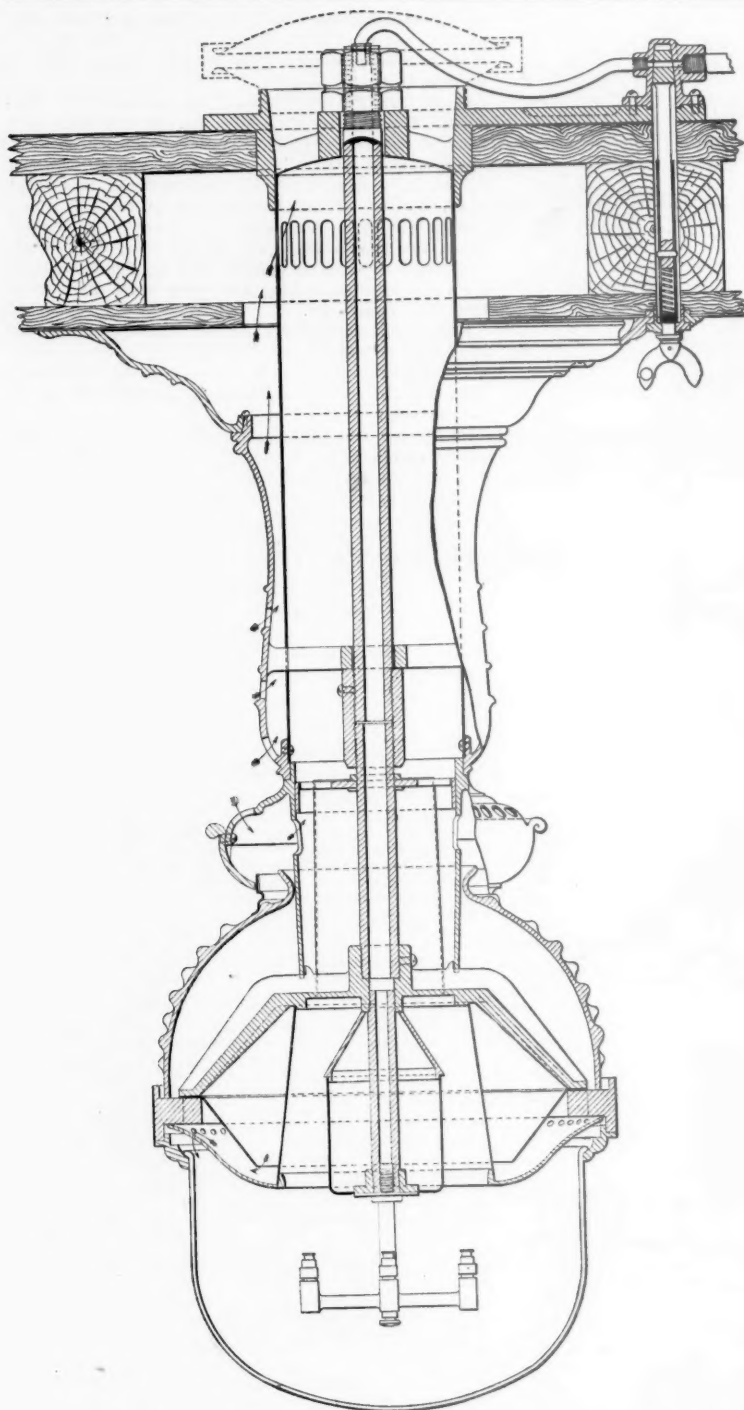
9th. Any road in interest may, if necessary, prepare a statement of corrections to adjust any discrepancies found in the account as above rendered and submit the same (together with a sufficient number of copies for all roads interested) to the accounting department of the receiving road who will check the said statement of corrections without delay, and if found correct return same, duly accepted, to the road rendering same, furnishing the roads interested with the copies also accepted, and will include the same in the next month's settlement by adding to or deducting from foot of abstract and division sheet; or if the said statement of corrections is not agreed to in time to be so included, the same shall be included in the first month's settlement after an agreement is reached by adding to or deducting from foot of abstract and division sheet. In case the receiving road desires to retain the original statement of corrections it must advise the road rendering same of its acceptance by letter or blank provided for the purpose.

10th. Where the amount of business done is large enough to justify it (the same to be determined by the roads in interest) drafts may be made weekly for approximate balances, the amounts to be agreed upon by wire. Final draft to close the account to be made on or before the 25th of the month as provided in section 6.

Pintsch Gas on the New York Central.

The "limited" trains of the New York Central & Hudson River, between New York and Chicago, both ways, will soon be made up of new cars of special design built by the Wagner Palace Car Co., and lighted by gas on the Pintsch system. This system has been repeatedly described in the columns of the *Railroad Gazette*, and the use of it on some 500 cars has made it familiar to many of our readers, who are aware also that it is very widely used in Europe.

The general plan of this method of gas lighting is the use of a superior quality of illuminating gas in a manner which



IMPROVED PINTSCH CAR LAMP.

makes it cheaper than the kerosene oil lamp, and which is devoid of all danger either to the employes of the road or to the occupant of the cars. The use of gas as a source of light may give rise, under certain conditions, to serious accidents, the most common of which are as follows: Asphyxia, or suffocation; explosion of storage tanks under pressure; explosion of a mixture of air and gas in the car; explosion of a mixture of air and gas in the lamp. The possibility of a dangerous fire under the conditions of a wreck are too small to be considered. This is not the case, however, with the oil lamp, which often sets fire in cars as well as in private dwellings.

The Pintsch gas is carried in a tank under a pressure of 10 atmospheres. If the whole contents of this tank were discharged directly into the car by the breakage of the pipes there would not be sufficient gas in the car to cause either suffocation or an explosion, and before the top of the car was filled with this gas, which is lighter than air, the tanks would be exhausted. Further than this, it must be remembered that the gas and products of combustion are discharged directly from the top of the burners into the atmosphere outside of the car, and as the gas is lighter than the air there is no danger either of an explosion or suffocation. It is more or less customary for the train men to turn on the gas and light the burners from above the lamp in a manner similar to the lighting of an Argand burner in our dwellings, with which we are all familiar. The small explosion which occurs under these conditions is the same as that resulting from the lighting of the Pintsch light by allowing the gas to escape into the lamp and placing a torch above. This shows the impossibility of a dangerous explosion in the lamp itself. The explosion of a tank of the dimensions used of $\frac{1}{8}$ in. steel, with dome-shaped heads attached by double rows of tap bolts, is impossible under a pressure of 10 atmospheres.

This company has devoted much attention to the element of safety, realizing that unless its system was made absolutely safe there would be no use in attempting to introduce

it in America, and its experience in Europe, where the state managements are in direct connection with the railroads, has been such as to develop the conditions of safety.

The application of the gas-lighting system to the Chicago "limited" has called for a new design of fixture to be in accordance with the ornamentation of the interior finish of the car. This lamp is shown in the cuts herewith. It is arranged to light the ceiling above as well as the book or paper in the hands of the passengers. Not long since it was noticed that while the lamp in common use radiated light downward to the passengers in a very satisfactory manner, yet it did not light the car as a whole as well as the oil lamps, which radiated light upon the ceiling. In order to give both a strong light below, and a cheerful light throughout the car, the coverings of the lamps have been changed and transparent mica shields are inserted to deflect the products of combustion, and an opalescent dome-shaped top covers the burners. The effect of this is most striking, and the change gives the result sought for, that is, a cheerful and well-lighted apartment.

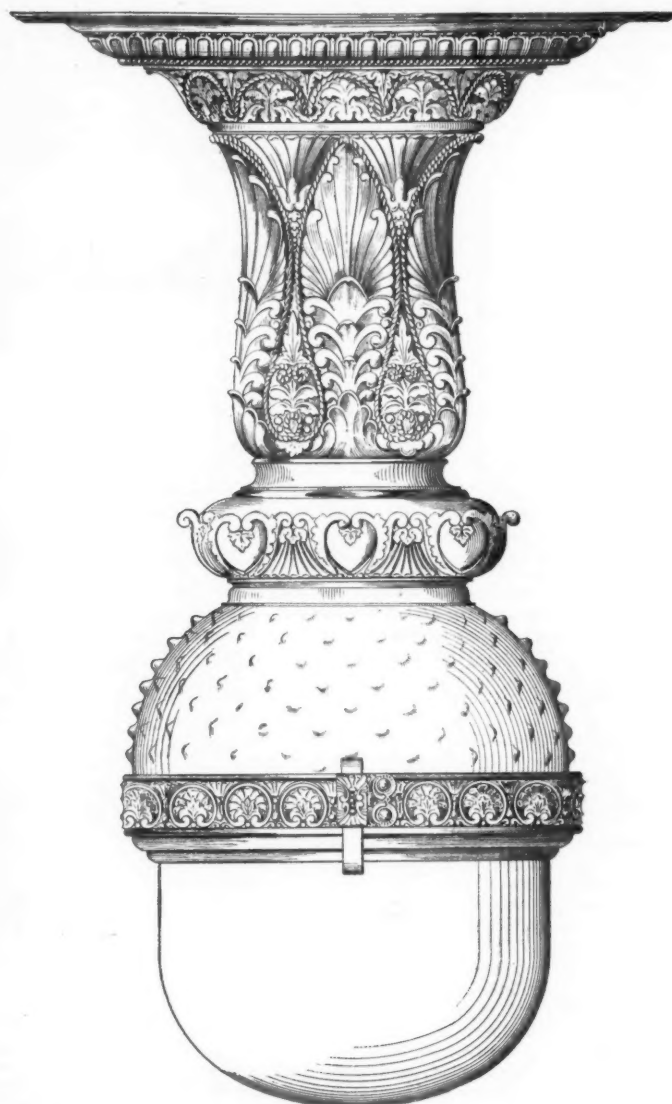
In the sectional view the arrows indicate the direction of the air from the car which passes outside, and also to the flame, and thus the constant upward current helps to ventilate the car. The holes in the metal surrounding the chimney by which the air enters are not shown in the elevation. The air passes around a tin shield to prevent a direct current going to the flame, and thus a steady light, unaffected by draughts, is obtained. The light shines through a short mica chimney that separates the supply air from the flame as shown in the cut.

The demand for a good, strong, uniform and steady light in passenger cars which will enable passengers to easily read as they ride is accompanied by the demand for better ventilation and the removal of the car stove, and it is to be hoped that the day is not far distant when one can read and write as he journeys during the evening, and if a satisfactory light can be obtained for the same or less price than the dim

and dangerous oil lamp, one feels that the public have a right to demand better illumination of passenger cars. Electricity and gas are rivals for the field of passenger-car illumination, and there is enough work for both to perform. So far as we now have progressed the cost and the simplicity, as well as extended use and reliability, are in favor of gas, while novelty and artistic effect produced by subdivision and location of the lights are on the side of electricity.

Double Cut-Off Saw.

The improved double cut-off saw illustrated herewith is a machine lately brought out by the Egan Company of Cincinnati, O. It is simple, quickly adjusted and easily handled,



and is considered a desirable tool for car builders and other wood workers, as it cuts both ends of a board absolutely square. The base is cast in one piece, and planed true to receive the mandrel housings which work back and forth on planed ways. An arm is extended from the column to support the end of the counter-shaft, close to the tight and loose pulleys.

The two housings are each adjustable to and from the centre for different lengths of stock, by the large centre hand-wheel on the front of machine. Each housing is fitted with a double-end saw mandrel running in self-oiling boxes. Each mandrel is adjustable independently of the other, and can be raised or lowered from the front or working side of machine to suit the thickness of stock being cut. An arrangement is also provided for lining up the saw mandrels with each other. Each mandrel has a compensatory belt tightener, making a powerful cutting saw, and suitable for both light and heavy work.

The tables are constructed to receive adjustable gauges which work flush with the table. Provision is made for running grooving and beading cutters in connection with the saws.

The capacity of the machine is from 4 in. to 6 ft. 6 in. in length, and $4\frac{1}{2}$ in. in thickness. One advantage of this machine in adjusting for different lengths is, that both housings are operated on at the same time by turning the hand-wheel in front.

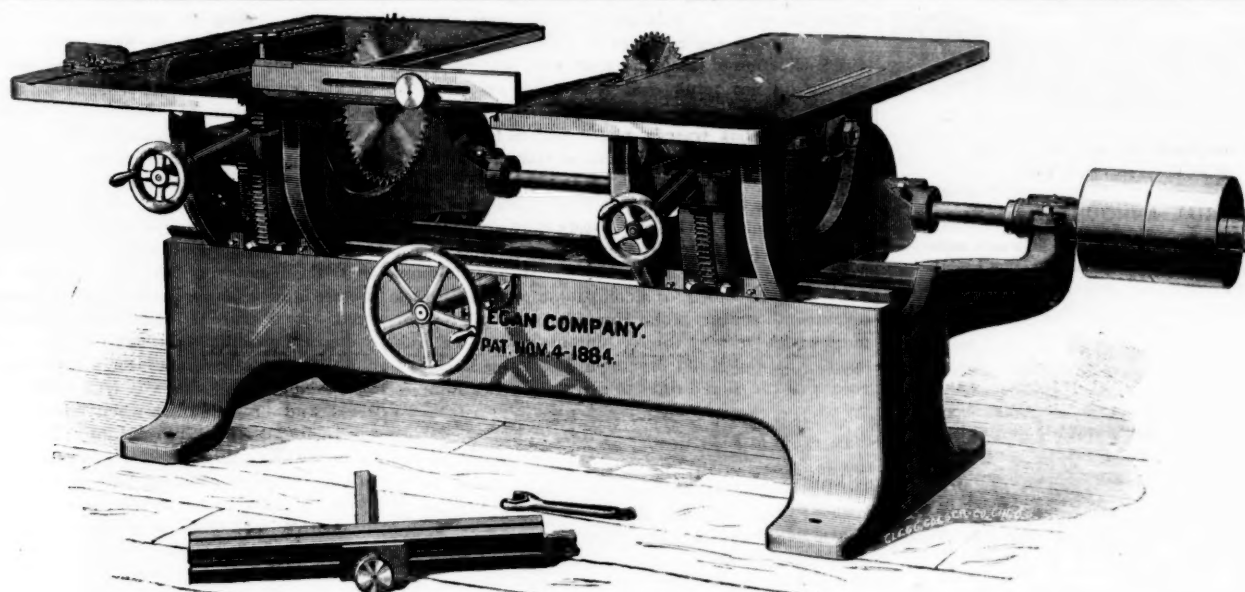
TECHNICAL.

Locomotive Building.

An order has been received at the Altoona shops of the Pennsylvania for 15 class "A" anthracite locomotives. It is stated that another order will soon be given.

Car Notes.

The J. G. Brill Co., of Philadelphia, has delivered the first lot of the passenger cars for the Barre road of Vermont. The Laconia Car Co., of Laconia, N. H., is building 20 more



DOUBLE CUT-OFF SAW.

platform cars, equipped with the Westinghouse air brake, for the same road.

The Wason Car Manufacturing Co. last week shipped two new passenger cars to the Port Jervis, Monticello & New York road.

The Elliott Car Works, of Gadsden, Ala., have just completed a lot of 25 refrigerator cars for the New Orleans & Northeastern.

The Louisville & Nashville has let contracts to the Missouri Car & Foundry Co. for the construction of 500 box cars, and is now receiving bids for 500 refrigerator cars.

The Union Pacific is asking bids for building 100 stock cars, 10 cabooses and some passenger cars.

The two parlor cars being built by the St. Charles Car Co. for the Toledo, Ann Arbor & North Michigan road will be delivered next week. They are equipped with the Johnston car seat.

Bridge Notes.

The Keystone Bridge Co. is constructing a new steel draw 143 ft. long for the bridge over the Boeuf River, on the Vicksburg, Shreveport & Pacific.

Work is in progress on the piers for the Louisville Southern bridge over the Kentucky River at Tyrone. The bridge is a cantilever, 264 ft. high, with a central span 551 ft. long and with side spans 208 ft. long each. The total length of the bridge and iron trestle work approaches will be 1,658 ft.

The Common Council, of Binghamton, N. Y., has appointed a special committee to invite plans and estimates for the proposed bridge over the Chenango River.

The city authorities will shortly contract for the erection of a bridge over the Maumee River, at Defiance, Ohio, to cost about \$50,000.

Bids will soon be asked for building two iron bridges at Logansport, Ind. One is to be built across the Wabash, about 600 ft. long, and one across Eel River, about 400 ft. long.

Messrs. Waddell & Jenkins, consulting and civil engineers, Kansas City, Mo., announce the removal of their offices to the Keith & Perry Building, of that city. As is well known, they make a specialty of the design of large bridges.

The Georgia road is constructing over the Oconee River on its Macon branch, a Pratt combination truss bridge with four spans of 150 ft. each. All the tension members are of wrought iron and compression members of yellow pine.

Manufacturing and Business.

The Dunham Manufacturing Co. informs us that the Dunham door has been specified for the cars now building for the Central of Georgia at the Anniston shops of the United States Rolling Stock Co.; 5,600 doors will be required. An order for the Nashville, Chattanooga & St. Louis, building by the Pullman Co., will take 400 doors.

William Tod & Co., founders and machinists, of Youngstown, Ohio, are building a pair of blooming mill engines for the Chester Rolling Mill Co., at Chester, Pa., each of which has a bed 30 ft. long, and extended so as to carry the counter-shaft, all formed from one casting. The cylinders are 30 by 48 in., and the two engines are solidly joined together so as to act on the shaft. The links are supported centrally, and the reversing gear is controlled by a hydraulic engine.

Cordley & Hayes, who recently succeeded to the business of the Indurated Fibre Co., have removed their offices to 175 Duane street, New York.

The Cleveland Twist Drill Co., of Cleveland, has recently added new machinery and expects to double the capacity of its works in the next six months.

The Tidewater Steel Works, Chester, Pa., report a large demand for their fish-plates. Among some recent orders are the following: 80,000 pairs to the Central of Georgia, 30,000 to the Savannah, Florida & Western, and 50,000 to the New York Central & Hudson River.

Within the last six weeks the Westinghouse Machine Co., of Pittsburgh, has shipped 13 steam engines, each of over 200 h. p. to foreign countries. Six of them went to London, England, to be used on electric light plants; one was sent to Truro, Nova Scotia, another to Chili, one to Montreal, Canada, and two to Toronto, Canada; one to Copenhagen, in Denmark, and one to Moscow, Russia.

The Billings & Spencer Co., of Hartford, Conn., is making drop forgings from a new bronze metal produced by the Ansonia Brass Co. It is used for parts of engines and machinery exposed to corrosion, and where greater strength is required than is afforded by ordinary brass or bronze. This company has just added two drop hammers, bringing the total number now in operation up to 40. It will soon erect an addition to the forge shop.

The Fowler Steel Car-Wheel Co., of Chicago, will, it is reported, erect a steel plant to make steel by the Robert process, introduced into this country by J. W. Bookwalter. It is in-

tended to make steel exclusively for rolled steel car-wheels, casting the blanks in a steel foundry, which is also to be erected. The company will at first put up one converter to hold a charge of 1½ tons. The foundry when fully completed will have a capacity of 250 wheel blanks a day.

The Aetna Machine Co., of Warren, Ohio, recently received an order from the Eureka Iron & Steel Co., of Wyandotte, Mich., for one of M. V. Smith's gas furnaces, producer and valves.

For several months past Ryan & McDonald, manufacturers of hoisting machinery, dump cars, derrick fittings and other contractors' supplies for railroad grading, etc., have been troubled to fill their orders because of increased demands. It has now been decided to enlarge their already extensive plant at Waterloo, N. Y., and new and special machinery will be added before May 1. This firm has for several years been manufacturing these supplies in Waterloo. Last week the firm made a South American shipment, and this week sends three loads of cars to Brooklyn, five into Pennsylvania, one car load into New Jersey, beside smaller orders.

The Bucyrus Foundry & Manufacturing Co., of Bucyrus, O., builders of steam excavating machinery, reports a brisk business. The company is now building a number of large steam shovels and dredges, one of which, it is claimed, will be the largest and finest ever built in this country, and will have the largest capacity of any dredger ever built in the United States.

Riehle Bros., of Philadelphia, report the following orders, among others: A 20,000-lb. horizontal testing machine for the Bridgeport Brass Co., Bridgeport, Conn.; a 20,000-lb. vertical testing machine for the United States Naval Academy, Annapolis, Md.; one rope twister to Columbus Iron Works Co., Columbus, Ga.; one turn-table and two pig-metal trucks for the New River Mining Co., Ivanhoe, Va.; a furnace charging scale each to the Stickney Iron Co., Baltimore, Md.; to the Mont Alto Iron Co., Mont Alto, Pa.; to Joanna Furnace, Joanna, Pa., and to the Struthers Furnace Co., Struthers, Ohio; one 200-ton forcing press to Providence, R. I.; two 4,000-lb. rolling mill scales to Newark Steel Co., Newark, N. J.; one 30-ton railroad track scale to the Phoenix Iron Co., Phoenixville, Pa.; a pipe proving press for the Pennsylvania Pipe Mfg. Co., and platform scales to Johnson Foundry Co., Johnstown, Pa. The firm has recently filled large orders for their platform scales for South America, and is also busy with orders for iron and steel wheelbarrows.

Several equipments of the Van Dorston coupler and draft gear have been ordered lately. A company has been organized in Philadelphia with a capital of \$500,000, to manufacture the coupler, draft gear and buffers.

Iron and Steel.

The Pittsburgh Co., of Pittsburgh, has been organized to manufacture iron and steel. The directors are Andrew J. Lawrence, William C. King and others.

The Duluth Iron & Steel Co., of Duluth, Minn., has let the contract for three 18 x 60 fire-brick hot-blast stoves to Gordon, Strobel & Laureau, Limited, of Philadelphia, together with other work. The stoves to be erected are of the Gordon-Whitwell-Cowper type.

The National Forge & Iron Co., recently organized at Chicago to erect a rolling mill, has secured a location for its works at Burnside, on the Illinois Central. Contracts for the erection of the buildings and the construction of the machinery have been let. The buildings will be principally frame, with iron supporting columns, sheet-iron siding and iron roof for fire protection. The machinery will be built at Fort Wayne, Youngstown and Pittsburgh. The company now expects to have its works completed by July 1.

After an idleness of about six weeks, the steel tube department of the Riverside Iron Works, at Wheeling, W. Va., resumed operation last week on double turn, giving employment to about 250 men.

The Structural Steel & Iron Co. has been organized by Lean & Blair, of Pittsburgh, and others, and has secured the patents for a new method of rolling iron and steel rails into merchant bar iron, structural iron, etc., recently invented by Joseph Gest, of Pittsburgh. This method will soon be put in operation at the Tidewater Steel Works at Chester, Pa.

The Cartwright Iron Works, near Steubenville, Ohio, was started up April 1, by the National Tube & Rolling Mill Co., of McKeesport. The mill has been enlarged recently and there are now 20 single and one double puddling furnaces, with a capacity to turn out about 45 tons of muck iron per day. All of this iron is to be rolled into pipe iron and shipped to the pipe mill at McKeesport.

The directors of the Reading Trust Co., which was appointed assignee of the extensive Reading Iron Works, this week decided to appoint an advisory committee to act with the officers of the company to decide upon the best means of winding up the affairs of the company.

The Southwark Foundry & Machine Co., of Philadelphia, has just finished four large duplex blowing engines for the new works of the Pennsylvania Steel Co., near Baltimore. Each engine weighs 755,000 lbs., and under each are two bed plates weighing 63,000 lbs. apiece. There are also now being built two dry dock plants for the United States Government navy yards at Portsmouth, Va., and Brooklyn, N. Y. Each plant consists of two centrifugal pumps, and engines to drive them. Two 1,100 H. P. tandem compound Porter-Allen engines are also being built to work on the same shaft, making a total of 2,200 H. P. These will run the rod mill at the Newcastle Steel Works, Newcastle, Pa. The company has recently built an addition 120 x 107 ft. to the foundry, and when completed it will contain two Sellers power traveling cranes to handle respectively 30 and 50 tons.

The Rail Market.

Steel Rails.—Sales are reported of 3,000 tons to an Eastern road, 8,000 tons to the Southwest, 3,000 tons to Arizona, and a round block taken by the Chicago mills, for St. Paul delivery, for a new Northwestern road. Three Eastern mills competed for this last order, bidding \$30 for Duluth delivery. The allotment has been increased by 200,000 tons. Quotations are: In the East, \$27@27.50 for large orders; at Chicago, \$30@30.50; at Pittsburgh, \$28 for small lots.

Old Rails.—Little business has been done, but it is stated that 4,000 tons are offered in the South and 2,500 tons in eastern Pennsylvania. Quotations in the East are nominally \$23. At Chicago, sales of old iron rails have been made at \$20.25@20.50, and at Pittsburgh American tees are quoted at \$23@23.50.

Track Fastenings.—Quotations at New York: Spikes \$2, and angle bars \$1.75@1.80, delivered.

The Lake Superior and Lake Michigan Canal.

Mr. W. H. Morrell, of New York, has appeared before the Michigan Legislature to apply for a charter for a canal across the upper Peninsula, commencing at Bay Antrim, in Lake Superior, a few miles east of Marquette, and terminating in the Little Bay de Noquet, near Gladstone. This will require a canal of only 36 miles in length, with in general light cutting, and it will save 271 miles navigation between Duluth and Chicago, or changing the navigation of the St. Mary's River, with its crooked channel and shoals, for that through the Forde des Mortes, between Green Bay and Lake Michigan, which, in spite of its name, is not a dangerous locality for steamers. The water power developed by a canal of large cross section, and about 20 ft. fall, should afford material aid to the interest account. Mr. Morrell says the company will be fully organized within 60 days from the grant of the charter. The construction of this canal would give three canals between Lake Superior and the lower lakes, viz., the present United States canal at the "Soo," with one lock 515 x 80 and a new one started, 800 x 100, the first with 16 ft. and the last with 20 feet of available water, and the Canadian Canal now building, with lock 600 x 85, with 18 ft. of water on its centre sill. All of these locks have 18 ft. lift. The projected canal will have to overcome this descent, and also the fall of the St. Mary's River below the lock, and it is proposed to build two locks for this.

New Ore Docks.

The Duluth & Iron Range is constructing at Two Harbors, Minn., an extension to its northerly ore dock at that point, which it is expected to have completed before the opening of navigation. The extension will give 95 new pockets, and will add about 11,000 tons to the present capacity.

The Minneapolis, St. Paul & Sault Ste. Marie is now building an ore dock at Gladstone, Mich., which is to have a storage capacity of about 7,000 tons.

The contracts have been let for the extensive dock improvements of the Cleveland & Pittsburgh, at Cleveland, for which \$800,000 was recently appropriated, and the work has commenced. Ellsworth, Morris & Co. have the contract to move the ore, and they will put in the improved machinery in time for the greater part of this season's business. A contract for building an additional slip, which will give the Cleveland & Pittsburgh 1,200 ft. of additional dockage, has been undertaken by J. A. & L. P. Smith. The company already has a dock frontage of nearly a mile and a half at Cleveland, and before the improvements are finished this will be greatly extended. It will probably be three years before the extensive improvements now in progress will be finished.

The Coventry Locomotive.

The Coventry locomotive, the distinctive feature of which is a return flue the entire length of the boiler, with the smoke-stack at the rear end, is now at the Louisville, New Albany & Chicago shops in New Albany, Md., being converted into an engine of ordinary type.



Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The decision of the Inter-state Commerce Commission that the legal three days' notice of reduction in rates must be counted from the time a notice reaches the Commission involves an obvious inequality between those roads which are a long distance from Washington and those near by. The Traffic Manager of the Southern Pacific remarks that his road must virtually give nine days' notice, as the time required for mail transmission to Washington is six days. The question whether the telegraph cannot be used naturally comes in here. If the Commission insists on counting strictly from the time the notice is actually received at its office, no railroad can be perfectly secure without an acknowledgment; and if this is not sent by wire there will be still further delay. The notice to the public is to consist in "plainly printing" the advance or reduction. This evidently does not require reprinting the full tariff in advance, in every case. A page containing 500 or 1,000 figures might be indorsed with a brief notice reading: "These rates will be reduced 25 per cent," etc., which would apparently fulfill the law. If this be so, many changes might be intelligibly stated in a form sufficiently brief to make telegraphing feasible. The legality of telegraphic communications is gradually coming to be more and more fully recognized, and if a response were to be sent by the Commission there should be no serious danger from errors in transmission.

It appears, from certain letters which have been recently discovered, that the Chicago-Omaha pool is not dead. It is clear that diversion of freight has been going on. It is not clear how long it has been practiced or how much freight has actually been diverted. The whole has been done under the operation of an agreement between Messrs. Miller, Hughitt, Cable and Stone. That such an agreement defeats the direct intent of the Inter-state Commerce law is plain enough. That it can be punished or even stopped by any specific provisions in that law is not so certain. The law forbids any common carrier to enter into such contracts. This provision has not been directly violated. If it proves that certain officers have entered into agreements of the same general sort, the question is, what can be done about it? You can prove that any such agreement is not binding; but in this respect the roads are no worse off than they were before the passage of the act. Can you fix any violation of the law on the officials themselves? Before this act was amended, it would have been quite impossible to do so. Even after the amendments to the 10th section it will be at least very difficult to do so. If the officials of several roads find that their traffic can be more advantageously handled by securing pretty constant proportions, so that the danger from a deficiency is greater than the advantage from a corresponding excess, it would be hard to convict them of a misdemeanor as long as they keep within the letter of the act, however much they may

violate its spirit. We should not advise such evasion, but we should regard it as a different thing from direct violation of law. This may seem like quibbling; but we do not think that it is fairly open to that charge. The section against pools made a misdemeanor of what was, in many cases at least, beneficial. That is precisely the kind of statute which it is hardest to enforce. The man who evades it, if he has any moderately good reasons in his favor, has every chance for safety. General history shows that this is, on the whole, a fortunate thing. It may be that railroad history will furnish another instance of the same sort. What a chance for a companion picture. In the seventeenth century, John Hampden risking imprisonment by his refusal to pay ship-money; in the nineteenth, Roswell Miller braving a \$5,000 fine in the advocacy of the sacred right to divert railroad traffic.

There is a good deal of difference of opinion as to the usefulness of buffers of any kind on freight cars. The 9-in. dead blocks proposed by the M. C. B. Committee to be used with the M. C. B. couplers will be of use in preventing the draw heads being driven completely home when coupled, and will keep the cars apart in case of broken draw-gear, but they will not prevent the full force of the shock being taken by the couplers when they come together with both knuckles closed. But this is a matter of very great importance. It must happen often in yard work that the cars will be driven together with both knuckles closed, and in this case the whole force of the shock will be taken by the coupler, the dead blocks not coming into action at all. The destruction of cars by buffing shocks in yard switching is very great. Indeed, it is one of the most important elements in the wear of freight cars. Therefore we may conclude that the rigid buffer will fail in one of its most important offices when used with the M. C. B. coupler. Matters will improve, however, in this particular, as the use of this form of coupler becomes more general, and finally when trains are made up entirely of trains so equipped we may suppose that the knuckles will nearly always be open when the cars come together. With spring buffers such as are used on our passenger cars and like those used on English freight cars, an illustration of which we give in another column, the case is slightly different. If such buffers have a long range of action, and have some resisting power when the cars come together with the knuckles of the drawbars closed, then they may be, to a limited extent, useful. The range of action demanded is, for each buffer, nearly three inches between the point of contact of the closed knuckles and the coupled position. It can be seen, therefore, that to be efficient, even in a minor degree, they must have at least 5 in. of action. The standard buffer spring in use to-day is fully compressed—about 2 in.—with an ultimate force of about 18,000 lbs. The amount of energy which such a spring will absorb is about equal to that stored in a 60,000 lb. freight car, moving one mile an hour. The buffing blows, which are disastrous to freight cars, are not those received at a velocity of one mile per hour, but those taken at 10 miles per hour; and while the draft spring in use to-day is of value in reducing the shocks at low speeds, yet it is almost useless when the blows are delivered at a speed of 10 miles an hour. The elastic character of the end and longitudinal sills furnishes the cushion which absorbs, to a greater or less extent, the buffing shocks at 3 to 10 miles per hour. While it is extremely doubtful, if it is advisable, to use much heavier buffing springs than those we are now using, owing to the severity of the reaction of these springs in cases of uneven brake application, yet there is a tendency on roads to use springs much stronger than are now common. The results of the use of such springs will be watched with interest. At the present indications are that the Master Car-Builders' automatic coupler will be compelled to take many of the severest shocks resulting from the impact of the cars, shocks from which neither a rigid nor a spring buffer can relieve it.

General Manager J. M. Whitman, of the Chicago & Northwestern, has sent a long letter to the Chicago-Missouri River roads, urging joint action in the matter of cutting off needless expenses. He cites, as an important point where this should begin, the stock train service. Competition, he says, has forced his company to run small lots of stock by special train, and to run all stock trains at a speed equal to, and in many instances exceeding, the speed of passenger trains. Trains often have to run with a half or two-thirds load. Mr. Whitman's proposal is sensible, and should receive the attention of those interested. If the Chicago-Missouri River roads have found it unprofitable

to run fast passenger trains, they certainly must be wasting money still faster by running freight cars at high speeds. With new cars, first-class wheels, air brakes and other favorable conditions, live stock can perhaps be hauled over those roads at 25 to 40 miles an hour with safety; but it is to be remembered that in the stress of sharp competition old cars and third quality wheels will be put into these trains, and speed will be kept up at many places where, with only hand brakes and the existing signaling appliances, it ought to be reduced; so that the demands both of economy and safety dictate a more conservative course than is now pursued. It is true that there are considerable differences in the facilities possessed by the different roads, and that, if severe competition is kept up, the evidence that the best road has won will undoubtedly be decided and unmistakable when speed, economy and safety are all taken into account; but there is ample room for fair rivalry and for each road to improve its service in every way it finds practicable, without going to extremes. Strife soon runs to excess, in making fast time as well as in cutting freight or passenger rates, and it would be an advantage on all sides if rash people could have devised for them some sort of automatic brake which would control their actions as effectually as the three-day limit is supposed to restrain rash rate reducers. Excellent locomotives which will not break down in important emergencies; wheels which will not pile up a \$5,000 wreck every few months; the provision of numerous cars with air brakes so that the brake can be used with a regularity and intelligent foresight which will enable good average speed to be safely maintained in spite of unprotected switches and yards; these and similar improvements must not be ignored, and those who are weak in this respect cannot fairly ask those who are strong to leave such advantages out of the issue. But it is not by any means certain that all needful weight cannot be given to this class of considerations while fully adopting Mr. Whitman's suggestion. Regularity is an important element in time as well as in rates, and there is room for enterprise at just this point. The roads might agree on a strictly uniform time-table between termini and still have plenty of scope for showing their individual superiority. Delays to be made up are of constant occurrence; the road which makes up for its own and those of shippers and connections in the most satisfactory manner ought not to lack the ability to let the fact be known. The road which makes time by reckless running deserves to be exposed by some truthful observer. Competitors generally do not find it difficult to learn of such occurrences. When shippers are two hours late in loading, the road which hurries them the least will most surely secure their favor, other things being equal. These are a few of the suggestions which will occur to every one who looks carefully at this problem. It will be well to study in this direction, and to wait until there are many more air-brake cars and much more perfect signaling arrangements before the average speed of the past ten years is greatly increased.

The forcible setting forth of the arguments in favor of the immediate adoption of a mixed per diem and mileage system for the settlement of interchange car service, which will be found in another column, is from the Car Accountant of the West Shore. Mr. Watson has given figures which constitute a definite addition to our store of knowledge on this subject, and those who know of his service on the committee of the Car Service Association, or have kept track of his arguments in the meetings of that body, will not need to be reminded that the length of this letter should deter no one from reading it. He has gone straight to the main question, and wastes no words on theories. The question is, Shall the big roads unite in the adoption of a plan whose reasonableness will commend itself to the poorer lines, while not frightening them by a large increase in expenses; or, shall they postpone action to the indefinite future, in the vain hope of jumping at once into a profitable system whose results would be so different from those of the present system that the change would be nothing short of a revolution. Mr. Watson's use of the term "loss" will not be agreed to by Mr. Yardley, and is not precisely correct, but this does not vitiate his argument. The stubborn fact is that the large roads have been lending cars to the smaller ones at less than cost. It is proposed to raise the price. Now, shall a stiff price be put on at once, or is it better to turn the screws gradually? Experience in other mercantile transactions would seem to dictate the latter. The argument in favor of dis-

turbing balances as little as possible is supported by the fact that those who are now suffering from the present inequitable system entered into it with their eyes open. It cannot be supposed that the New York Central and the Pennsylvania, when building their thousands of cars to be lent to connections all over the country east of the Mississippi at 15 cents a day, were wholly ignorant of the effect that this policy would have on their treasuries. They must have known that the tendencies at work would in all probability entail a deficit, so far as mileage-receipts proper were concerned. Undoubtedly they assumed that the hold it gave them on traffic would compensate for the positive losses in the car department. If, now that traffic receipts are being inexorably crowded lower and lower every year, they resolve to cut off this questionable method of securing freight it would seem no more than right to make the change gradually, so as to enable those who must suffer from it to adjust themselves to the new régime as easily as possible. The discussions of the past two or three years might perhaps be claimed to constitute a sort of preliminary notice, but it is hardly fair to take this stand for the reason that the true bearings of the question have been so little illuminated in what has been said. Improvident managers can well say that they have recognized no definite warning to buy or build more cars. Rate divisions between roads doing joint traffic are liable to be disturbed somewhat whenever any sort of a per diem system is inaugurated, however gently it may be introduced; this is another reason for beginning with a low per diem charge. Freight rates are disturbed enough already.

Unrecognized Merits of the Standard Code.

We print on another page some of the more interesting of the train rules contained in a new code issued by the Chicago & Northwestern, together with some account of others which we have not space to reprint in full. This new book has evidently had much care bestowed upon it. It should be a source of gratification to every one interested in good railroading, and the men who edited and compiled it are to be congratulated on their good and careful work. One of the most stagnant spots in the blood circulation of the railroad system has been, and is, in just this feature. Rules of the most antiquated kind not only have been contentedly put up with for a long time but they still are tolerated. The Chicago & Northwestern has a number of good rules which are not in common use, though they ought to be, and our extracts should therefore be carefully read.

But while seeing so much in this work to commend we cannot shut our eyes to the obvious comparison between it and the Time Convention code. The adoption of an independent code which is much better than most other independent codes enhances the feeling of regret at the mistake made, because a poor work would be sure to be crowded out with all the more certainty because it was poor. The good points in the Northwestern's book speak for themselves, or at least many of them have been very fully set forth in these columns heretofore; but the lack in it is apparent only by comparison with something better, and we therefore feel constrained to say a word.

The Time Convention, which has provided for such an important work as that of its special committee on this subject, and which has shown such intelligent appreciation of that work in its meetings, has now a duty incumbent upon it to publish the merits of its code, and to see that they are not allowed to fail of their true mission from mere carelessness or ignorance. Members should not only approve of the committee's ideas while in the convention hall, but should test them at home, and see that members who have been indifferent are awakened. Moreover, roads outside the convention should be "labored with" whenever opportunity offers. We do not know the views of the officers of the Chicago & Northwestern, but a manager of another large road in that region gave as a reason for not taking a sympathetic interest in the Time Convention's work, that the new code was "not adapted to the Northwest." He seemed to feel convinced that most of the managers in that region agreed with him, and we have no doubt that he was right. As, however, there is in this new Chicago & Northwestern code no trace of any special or local condition to which the uniform code, as put forth by the convention, would not be applicable, one is forced to the conclusion that the invaluable work of the committee deserves just as much recognition in the Northwest as in any other part of the United States.

The most salient feature of the uniform code is its accuracy of language, with the absence of unneces-

sary words. This, with the careful omission of duplicates—i. e. rules or parts of rules which tell the same thing, though in different words, that has been told in another place—embodies a large share of the great amount of work that the committee did. The committee made a great many decisions concerning vicious or unnecessary rules to be omitted, but it is not reasonable to expect the value of this to be fully appreciated by those who did not listen to the discussions when the code was under consideration in the convention. It is reasonable, however, to ask that the obvious merits we have mentioned be allowed their true value. It would seem as if any one with a day's experience in compiling or revising a code of this kind would have considerable appreciation of the fact that the committee of eight spent several weeks' time on their work, often consuming a number of hours on a single point.

We have referred to a mischievous phrase in C. & N. W. rule 108. Its ill effect is partly remedied in a subsequent paragraph, but this serves as an illustration of the point we wish to emphasize. We have no doubt the committee spent hours in coming to the conclusions they did, and that the reasons supporting the way they took to provide against the use of the phrase in question would be found unanswerable. In fact, that comment was freely made in reference to all their rules by disinterested members of the convention in the discussions. Every repetition of a rule weakens a code unless it is pointed out as a repetition and the reason for its second appearance is given. But the Northwestern code has many rules which only show that a previous one on the same subject is regarded as unsatisfactory. The simple matter of good grammar is not so simple as it seems on the surface. It is not hard to find phrases in the uniform code which must have required more than one sitting to satisfactorily compose, and it is easy to find those in the other which evidently were turned off as finished with far too little care.

In this as in other points we must not be regarded as holding up to disapproval the particular road named; we refer to its work as a specimen of that being done by a number of companies. A particularly enterprising young superintendent who recently adopted the Standard Code made the mistake of admitting poor proof-reading and careless arrangement, and in the additional rules failed conspicuously to maintain the standard of clearness and perspicuity of the standard.

This matter of the additional rules—those covering subjects for which the Standard code does not provide—is an important one. From an examination of a number of codes that we have seen—even those in which the standard portion is very carefully treated—it seems to be the easiest thing in the world to insert a rule, the aim of which is good, but for the existence of which the reason is doubtful, or a rule the position of which, as regards others, is illogical, and its intelligibility, as compared with the Standard, positively deficient. Any one who has examined a number of books and noticed how common these defects are will readily understand that we can have no possible intention of criticising any particular road or officer. Nine out of ten, or 99 out of 100, of all books issued seem to have suffered from the superintendent's lack of time to carefully revise them. Hurried work appears on half their pages.

But space would forbid, if the reader's time did not, that we present here all the arguments for the Standard Code. The simple summary is that eight of the most intelligent, conservative and far-sighted managers and superintendents spent a great amount of time in perfecting it, and that all who have investigated their work agree that it was needed. Numbers of managers who certainly belong to the first grade, and who, therefore, could be trusted to get up original codes individually if any man could, have recognized the value of the joint work by adopting it. This being the case, it is hard to believe that those who still depend upon their own experience, abilities and available time, with the expectation of getting the best, have fully investigated the subject. Members of the Time Convention should urge such investigation where it has been wanting.

We think it is to be regretted that the Chicago & Northwestern has rejected or altered some important rules of the Standard code, but we will not discuss that point at this time. We wish here to emphasize the methods and not particularly the substance; not what shall be put into rules, but the way in which it should be arranged. Duplicate or single train orders, red or green signals, are questions which may admit of more or less difference of opinion; but whether or not men shall be instructed in clear and simple language is a question to which there can be but one rational answer.

Proportions of Grate Areas.

The circular issued by the committee appointed by the Master Mechanics' Association on the subject of the "Best Proportion of Flue and Grate Area in Locomotives," contains the following questions: "In designing or ordering locomotives do you proportion the amount of grate surface simply to suit the quality of coal likely to be used, or do you believe if the boiler is to be in its most effective condition that the grate surface should bear some definite proportion to the flue heating surface, or to the gas opening through the flues? If you proportion, give the ratios you use, or would like to use." It would hardly seem possible to give a correct or satisfactory answer to these questions, because there is no relation between the proper amount of heating surface and the amount of grate surface necessary.

The grate surface of a locomotive is logically determined only by a consideration of: (a) The character of the fuel to be burned. This must comprise a consideration of not only the heating power of each pound and the size of the fuel, which restricts the opening of the grate bars, but also must consider whether or not the fuel be one that melts before burning, if the bed of coals can be broken up and the fires cleaned while running, or whether, like an anthracite fire, it must remain undisturbed during long runs. (b) The force of the blast; that is, its power to draw through the grate the air to support combustion. (c) The amount of fuel to be burned in a given time. (d) The general design of the locomotive upon which the boiler is to be placed. This last is not the least important item to be considered; it is rather one which the designer will find the most inexorable, and it is the limitation which in almost every case governs the determination of the grate area.

In order to assist the development of the American locomotive we must realize what are the true and fundamental principles which govern locomotive designs, and the results which we seek will never be attained until these fundamental principles are comprehended. It is evident, to all careful observers of the great variety of locomotive designs in this country, that some of the many designers must be in error. All of the various and widely differing productions cannot be correct, and even when due allowance is made for the different varieties of fuel and operating conditions there must remain considerable error. It is to be hoped that the replies to the circular above mentioned will call attention to the wandering manner in which locomotives are originated.

The great variety of proportions shows that there is an evident misconception regarding the office of a locomotive cylinder, and it probably arises from the fact that locomotives are rated, in most cases, according to the dimensions of that detail. In truth, the cylinder is merely an accessory to the general plan of the engine. It might be larger or smaller, within reasonable limits, and not in any way impair the action of the locomotive or its hauling capacity. It is merely a device for transmitting the energy stored in the steam to the driving mechanism of the locomotive. While this independence of design exists in the case of the steam cylinder, yet it is not true of the boiler. Within quite wide limits, a given amount of steam will do a given amount of work, or haul a certain number of cars regardless of the design or character of the steam cylinder and its connections. Thus we find that locomotives use about 30 lbs. to 35 lbs. of water per horse power per hour, and consume from 10 to 15 per cent., of the total power generated in friction. Now these figures will remain nearly constant whether the cylinder be a little larger or a little smaller in capacity.

Between the boiler, however, and the work to be done there is a direct connection. If a certain amount of steam is required to do a given amount of work, then the boiler must be designed to furnish it, and, therefore, it would seem that the boiler should be proportioned directly from a consideration of the work to be done, leaving the cylinder to be determined from subsequent considerations which readily present themselves. In order to design a boiler to generate a given amount of steam at a given pressure, something besides the total heating surface must be known. The exact distribution of this heating surface is a far more important matter than the actual amount of it. What we need to know at the present time, in order to determine a basis of locomotive design, are the relative values of the various kinds of heating surface in the locomotive boiler. Having obtained this information, we can then equate each of the different kinds of heating surface, according to any standard to be agreed upon, and, thereafter, by applying or comparing the known steam generation of any boiler with its heating surface, equated to the stand-

and adopted, we can readily determine the actual value of each square foot of the standard heating surface. Having accomplished this, we can readily estimate, in a manner sufficiently accurate for the purpose of design, the steam generating power of any locomotive having a given fire-box temperature. A standard fire-box temperature can be assumed and the relative degrees of the temperature in fire-boxes, burning various kinds of fuel at a standard rate, readily be observed. Having obtained the steam generating power of the heating surface in the manner above mentioned, for the standard fire, it could then be reduced to the actual conditions by means of the factor representing the relative heating effect of the fire intended to be used in connection with such heating surface.

It would appear from this that the essential element in locomotive design, the element to which the work to be done bears the closest relation and the one which demands more attention than all others—the lack of consideration of which has caused more failures in locomotive performance than all others—is the capacity for steam generation. It is evident that nearly a fixed amount of steam at a given pressure is necessary to accomplish a given amount of work, and this steam must be furnished. The heating surface must furnish it, and the grate area must be sufficiently large to enable enough fuel of the kind to be used to be burned, with the blast available. Therefore, upon the work to be done and the class of fuel to be used, as well as on the force of the blast available, does the grate area depend, just as is the case in marine and stationary steam plant. There is then a direct connection between the heating surface and the work to be done, and while the capacity of cylinders may vary within reasonable limits without changing the amount of work done, yet the amount of steam generated in a given time is fixed, and furnishes a measure of the work which can be done with a given locomotive.

So little in the way of accurate experiment has been performed in this matter that we cannot expect definite conclusions in the committee's report, but it would be a much welcomed assistance to all locomotive designers if the committee would treat this subject exhaustively from a scientific standpoint, and leave embodied in the annals of the Association a report containing information on this particular, which would serve as a guidance to all who may in the future make experiments with a view to determine the best proportions of locomotive details.

Minority Rights.

A decision of Chancellor Cobbs, of Alabama, in favor of the minority stockholders of the Memphis & Charleston, and adverse to the East Tennessee, Virginia & Georgia, has attracted some interest. The Court holds that one corporation has no common-law authority to purchase stock in another corporation. Its directors may, under certain circumstances, be forced to do so, as the only means of keeping any security for a debt; but they have no right to do it as a means of controlling elections. This being the case, the Court will interfere in behalf of the minority stockholders, without insisting that they shall show where specific damage has been done them by the action of the purchasing corporation.

Looked at from one point of view this decision has much to be said in its favor. There is no doubt that the rights of minority stockholders have been shamefully disregarded in cases of just this kind. Even if the board of directors chosen under the influence of the purchasing corporation consists of good men, they feel their duties to the large corporation more fully than to the smaller one. They are only accidentally connected with the latter; their names and reputations are identified with the former. But if, as frequently happens, the directors are not above reproach, and are more intent on their own personal speculations than on their characters as trustees, the double directorship gives them every opportunity for making money by doubtful methods. They can so ignore the rights of the minority stockholders as to depress their property far below its real value; and having acquired it themselves at these low figures, they can suddenly make such a change of policy as to give it an inflated value at the expense of the other company which they represent. In all these cases they take none of the risk and get all of the gain.

The universal application of principles like those of the Alabama decision would not wholly prevent such abuses; but it would compel the speculative director to take considerably more personal risk than he does now. He would have to buy the stock of the smaller corporation with his own money instead of with that

of some one else. In his effort to depress the securities of the minor road, he would have to bear a temporary loss while the process was going on; and if, in the course of time, he and his friends should be ousted from the control of the main line, his temporary loss would become a permanent one. The stockholders would not find themselves loaded down with worthless securities at the moment when they were trying to inaugurate a policy of reform.

But we would not advise any minority stockholder to delude himself with the idea that the millennium is coming all at once. The attempt to apply the principles of the decision to actual facts at once indicates the difficulties of the subject. How are we to draw the line between cases where a corporation buys stock to protect itself from loss, and those where it buys it to control an election? In the roads by which other companies lose money, the chief value of the stock is for purposes of control. The only way in which one corporation can protect its interests at all is by controlling the policy of the other. To allow the first and forbid the second gives rise to all sorts of confusion. It is not easy to see the way out of this difficulty. To prohibit such purchases altogether is out of the question. To require special legislative authority in every case would involve a great deal of public corruption as well as much inconvenience to legitimate interests. To draw a common law distinction which shall allow such purchase where it is really necessary, and prohibit it elsewhere, seems impossible for the reasons which we have just indicated.

We are inclined to think that the first steps toward reform will lie not so much in the direction of limiting rights of purchase as in increasing the rights of minorities after the purchase on the one hand, and the responsibilities of the directors who make such purchases on the other. The fact that the directors, as representatives of the main corporation, may be acting *ultra vires*, ought not to be made the chief ground of control, because it is not here that the chief danger lies. The chief danger is that the minority stockholders of the smaller corporations will be defrauded by men who ought to be acting as trustees in their behalf. Minority representation in boards of directors may do something to check this evil; increased publicity will undoubtedly do something; a readiness on the part of the courts to interfere in these matters will do a great deal. The Alabama decision is a significant symptom of this increased readiness to interfere. It has for this reason an importance in itself, above and apart from any question of the practical usefulness of the principles which it lays down.

A "Contemporary" on Metal Ties.

We are pained to observe that the gentleman who edits the metal tie department of the *Engineering and Mining Journal* continues to mislead his colleagues on that esteemed and valued contemporary by statements of things that are not so and by wrong deductions from things that are so. For example, in the last issue of that journal the "apathy" of the *Railroad Gazette* on the subject of metal ties is deplored and the statement is made that "The wide-awake managers of this road [the Pennsylvania] agree with Mr. C. P. Huntington, of the Southern Pacific, on the importance of the subject, and have just decided to have a mile of track on the New York Division laid with 'Standard' steel ties. This is the second experiment made by this company in this direction, the former one being with the heavy Webb tie, which we described and condemned in our issue of Dec. 29, 1888, and which apart from its weight and cost was not found suitable by the Pennsylvania Railroad." The facts are that the Pennsylvania has experimented for several years with steel and iron ties of various designs; that no iron or steel ties have been ordered this year, nor is it the intention to order any, and that the statement quoted above is without foundation. Our readers are all familiar with the fact that the Pennsylvania has for nearly two years been experimenting with two miles of standard London & Northwestern track, bull-head rails on steel and wooden ties. The last half mile of that track came into use on the New York Division late last fall—hence possibly the error to which attention is called here.

Again, in a recent issue of the same journal the statement is made that "preparations are now being made to place a section of 'Standard' steel ties on the Manhattan Elevated Railway preparatory to its adoption," and it is expected that the great saving to be shown will confirm "the excellent judgment of Colonel Hain in adopting them." Our readers would be very much surprised to know that any steel tie had been "adopted" by the elevated, or was likely

soon to be, but after reading the tripping phrases quoted here they will be still more surprised to know that no order has been given by the elevated management for steel ties, that none is contemplated, and that there is not the ghost of a chance of such a change as the phrases imply.

The introduction of the name of Mr. Huntington in the paragraph first quoted is warranted by the following statement, attributed to him in an interview telegraphed from a way station in Texas: "I will have the best transcontinental line, and will make all needed improvements this year. I will use iron ties for my entire system." Just what is included in the last three words it is hard to say; but supposing it to include the 6,000 miles of the Southern Pacific system, and 1,000 miles east of the Mississippi, and taking 2,600 ties to the mile, at \$3.50 per tie, the cost of putting metal ties on Mr. Huntington's "entire system" would be \$63,700,000. Notwithstanding the happy juxtaposition of the words quoted, we doubt if the entire system will be laid with iron ties this year.

Our contemporary has been further misled as to the standard width of ballast on the railroads of the country. Some time ago it made the statement that nowhere except "in print and illustration" is the ballast 13 ft. wide. Without going far into this subject we considered it sufficient to point out that drawings of the standard track of various important roads show the ballast 13 to 20 ft. wide for single track and 26 to 33 ft. for double track. In reply to this the *Engineering and Mining Journal* publishes (March 23) a "view on the best railroad in the United States," purporting to show that on that road the 8-ft. ties "protrude beyond the sides of the road-bed; thus the latter must be very much under 8 ft. in width. The road-bed foundation may be wider, but the ballasted portion commonly called 'road-bed,' in which the ties rest, is, as a rule, under 8 ft." Even the picture published warrants no such statement; but we do not ask the editor of the *Journal* to take our word in this matter. We advise him to take a series of short trips on the various roads running out of New York and watch the track from the rear of the train.

We beg the reader's pardon for the space given to a discussion which really has but a trifling bearing on the subject of metal ties, but the repeated errors of statement seem to call for some notice.

Cylinder Condensation.

A correspondent has called attention in another column to a point which has some bearing upon the question of cylinder condensation. Owing to the length of the editorial to which he refers, we were compelled to omit all the minor actions which modify or increase the total amount of cylinder condensation. Compression is, when carried up to the pressure of the entering steam, an action which reduces the difference in temperature between the entering steam and the walls of the passages and the cylinder which the steam first strikes. However, as soon as the piston moves away from the end of the stroke, the surfaces then exposed are at a much lower temperature, and the walls against which the steam, after that time, comes in contact are at a temperature which, we believe, fully admits of our former "blizzard" comparison.

Regarding the economy of compression, our correspondent's attention is called to the well known fact that the Corliss type of engine, which runs with little or no compression, is yet ahead in the race for a minimum of water consumption per horse-power per hour of those engines which compress steam from a back pressure of 1 lb. to a boiler pressure of 100 lbs. This superiority is shown not so clearly by theory as by actual tests. One of the reasons for this may be that the piston is compressing steam in that class of engines which compress up to the boiler pressure, from 16 to 115 lbs. absolute pressures. This is a compression of seven times, while during expansion the steam is, in general, expanded but four times, and in the case of the locomotive the difference between the ratio of compression and the ratio of expansion is much greater. The losses resulting from compression are much increased, because the work which is transformed into the heat which raises the temperature, and therefore the pressure of the compressed steam, has to be taken from the useful work of the engine, which has been obtained at a great loss. There are many other aspects of this question, of the efficacy of compression to reduce the losses resulting from a wide range of temperature in a steam engine cylinder, but no course of reasoning with which we are familiar, and which is logical, shows to us that compression has any other effect than to slightly modify and change the character of the causes which produce condensation in steam cylinders.

While Rankine treats, as our correspondent suggests, of cylinder condensation in a minor way, yet does he not also treat many other subjects in the same way? Within the limits of such a volume as the "Steam Engine," it can hardly be expected that a subject about which so little is known could be treated exhaustively. Our correspondent will notice that Rankine treats principally of steam in "non-conducting cylinders," it being the only kind of cylinder to which formulae are applicable. The best illustration of the magnitude of cylinder condensation, under varying conditions, is that of the many authenticated experiments, made with steam engines using perfectly dry steam, by which it is shown that the actual amount of water used per horse-power is far in excess of the amount which a simple calculation would show to be sufficient, or is registered by the indicator, if the steam was not condensed somewhere in the cylinder.

Cylinder condensation may not be the best title, or rather the most explanatory name for this action, which surely does, and always has taken place in steam cylinders, excepting in those cases where the steam was previously superheated to a high degree, or furnished with a jacket in which steam at a high pressure was used; but it is a generally accepted term for an indefinite action. In the case of the use of the steam jacket above noted, it was found that the condensation, which ordinarily took place in the cylinder, then took place in the jacket, the water per horse-power per hour remaining about the same as without it.

Cylinder condensation has been a favorite topic of investigation for all steam engineers who have had an opportunity for experiment, up to the present time. It has not always been expressed as cylinder condensation. Sometimes it is stated as a "ratio of efficiency" and "variations of water per horse-power per hour under varying conditions;" but let it be called whatever it may, it is evident that all steam engineers are looking for some chain of evidence which will enable them to determine the amount of water, in excess of the theoretical amount, which will be needed, in the form of steam, to drive steam engines, under known conditions. Several series of experiments are being made at the present time on this subject, the results of which we hope to give to our readers at an early date.

The Prussian State Railroads.

The report of the Prussian State Railroads for the fiscal year ending with March, 1888, shows that at the close of that year the government was working 13,954 miles of rail road, or 80 miles more than the year before. With this is not included 64 miles of narrow gauge roads in the upper Silesian mining and blast furnace district, and 122 miles of lines not open for public traffic.

The capital of the state railroad system was at the rate of \$104,240 per mile of road.

The number of stations was 2,132, besides 1,241 places at which stops are sometimes made, distinguished as "stopping places" and "stopping points." The average miles worked during the year was 13,573.

The earnings, reckoning four marks to the dollar (which is about 2½ per cent. too much), were:

	1887-88.	1886-87.	Increase.	P. c.
Passengers.....	\$45,157,543	\$44,231,431	\$1,926,112	4.4
Freight.....	129,377,870	118,307,033	11,070,837	9.4
Other.....	7,065,215	6,838,051	227,164	3.5
Total.....	\$182,600,628	\$169,376,515	\$13,224,113	7.8
Per mile of road.....	12,730	12,263	477	3.9

The report says that of the increase in receipts about \$1,500,000 was due to the working of additional lines of railroad, and \$2,750,000 to charging for carrying freight for the railroads themselves. Previous to the year in question, freight for the use of each subdivision of the state system under a "directory"—from 700 to 2,000 miles in each—was charged for when hauled over the lines of the other "directories," but not on its own. Subtracting these amounts from the total increase of earnings, we have left \$8,984,110 as the increase due to growth of traffic, which is 5.3 per cent., and the increase in freight earnings was 6 per cent., which is a rapid rate for a country like Prussia.

The working expenses and net earnings were:

	1887-88.	1886-87.	Increase.	P. c.
Expenses.....	\$96,736,645	\$93,325,987	\$3,410,658	3.7
Net earnings.....	85,863,983	76,050,531	9,813,452	12.9

The increase in expenses seems very small, in view of the large sum charged for hauling materials last year, and not the year before. Nearly three-fourths of the increase in gross earnings was saved. But the additional traffic was carried without the considerable decrease in rates which usually accompanies a large increase of traffic in this country; and the increase in the payments for wages, which form nearly one-half of the total working expenses, was only 2.4 per cent. General expenses increased 8.7 per cent., maintenance of road 9½ per cent., and transportation expenses 10.6 per cent., while there was the large decrease of 8.6 per cent. in other maintenance expenses. It seems that the force ordinarily employed is large enough to conduct considerably more than the ordinary traffic, so that an unusual pressure of business compels the employment of very few additional men.

The net earnings were at the very satisfactory rate of 5.77

per cent. of the capital invested in the railroads. Part of this capital, however, has been retired through sinking funds, etc., and on that part still remaining the net earnings were at the rate of 6.54 per cent.

Of the total earnings 70.9 per cent. was from freight, 25.3 from passengers and 3.8 per cent. from other sources. The proportion from passengers is not larger than in many parts of the United States. Only 4.3 per cent. of the passenger earnings of the Prussian roads was from first-class passengers, the rest being divided between second, third and fourth class and soldiers who pay a special rate. The proportions of passengers and passenger-mileage of the different classes are striking, having been:

	1st.	2d.	3d.	4th.	Military
Passengers.....	0.5	10.0	55.4	31.9	2.2
Pass.-miles.....	1.7	16.0	41.7	31.4	6.2
Av. miles traveled.....	50.3	29.2	13.7	19.6	50.4
Cents per mile paid.....	3.16	2.07	1.30	0.824	0.589

Thus only one passenger out of 200 traveled first-class, and doubtless in most trains there was no first-class passenger. The first-class passenger traveled on the average about twice as far as the second-class, and more than four times as far as the third-class; but the fourth-class passenger traveled nearly one-half further than the third-class. The average passenger journey for all classes was 19 miles, and the average rate 1.248 cents per mile against 1.256 the year before, when the proportion of high-class passengers was larger.

The passenger earnings per mile of road were \$3,206. The average number of passengers in each car was about 10; the receipts for use of sleeping cars were \$80,000! The receipts for carrying baggage and dogs were \$1,185,277.

The total passenger traffic (passenger miles) was 4.9 per cent. greater than the year before. The movement was equivalent to 352 persons carried each way daily over the entire system. The freight traffic was unusually and unexpectedly large, partly owing to greater industrial activity, and to some extent to an interruption of river and canal traffic by unfavorable weather. The freight earnings were \$9,056 per mile of road, which was \$459, or 5.3 per cent. more than the year before. The percentage of the earnings from certain general divisions of the freight were:

	Expenses.	Freight.	Post-office.	Live stock.	Army.
	2.3	87.4	0.1	3.4	6.8

The report also shows the tonnage, the ton-mileage and the earnings of each class of freight, and thus enables us to ascertain what were the actual average rates received per ton per mile, which is there somewhat (as it is here very much) different from the rates printed in the tariffs. As we have shown heretofore, the goods shipped in less than car-load lots form an insignificant point of the whole, while just about one-half of the freight is taken at special rates. The percentage of tonnage and of ton-mileage of each class, and the average rate per ton per mile in the year referred to, were:

	Tons.	Ton miles.	Av. rate per ton per mile.
Fast and express freight.....	0.3	0.4	8.484 cents
Package freight.....	3.9	4.3	4.245 "
Carloads of.....			
Class A.....	1.1	1.7	2.583 "
Class B.....	1.7	2.9	2.254 "
Special tariff.....			
Class A2.....	2.2	2.2	1.984 "
Class I., II. and III.....	41.1	38.6	1.185 "
At special rates.....			
Express goods in parcels and half carloads.....	0.8	0.9	2.947 "
Carloads of 22,000 lbs. or more.....	48.9	49.0	1.904 "
Total.....	100.0	100.0	1.344 cents

Thus the whole freight shipped in quantities less than 11,000 lbs. was less than 5 per cent. of the whole, and this includes what is here shipped in charge of the express companies. Seven eighths of the whole freight is carried at the rates of the special tariff classes I., II. and III. (which are lumped together in the report), or at special rates.

Coal forms a larger part of the traffic than is generally known, no less than 49,888,000 tons (of 2,204 lbs.) having been forwarded last year, which is a third more than our production of anthracite. This quantity was 6.9 per cent. more than the year before, and it produced 9.7 per cent. more earnings, which amounted to \$41,197,750, or 82½ cents per ton. Coal yielded 31¼ per cent. of the total freight earnings.

The total freight traffic (ton miles) was 7.4 per cent. more than the year before, and was equivalent to the movement of 817 tons (of 2,000 lbs.) each way daily over the entire system. The average rate fell from 1.3475 to 1.344 cents per ton per mile. The previous year's rate would have produced about \$300,000 more earnings.

Block Signals.

"Langdon," the trainman whose communications are familiar to our readers, writes us concerning the letter of "S" in the *Railroad Gazette* of March 22. He points out that "S" and himself do not disagree so seriously as might appear, and then continues:

While I believe the Sykes system by far the best of any I have run under—and my experience has been with three roads using the block—I do not imagine that the Erie officials are quite as confident of its being a perfect safeguard as you imply, for they require the usual protection by flag. Between Turners and Jersey City freight trains do not receive clearance cards. The block, so far as they are concerned, is absolute, excepting only when they are to take a siding between block stations. At regular water stations, and within yard limits, all freight trains are required to approach under control, expecting to find a train standing unprotected by flag. If the system is perfect practically, why should it be necessary to flag when an unexpected stop is

made? Extra precautions! It is just this extra precaution that you rarely get, and that divides the responsibility between the block and the flagman. * * * My most serious objection to the block is that it makes the best of trainmen careless. One Sunday recently an east-bound freight got on the time of one of the Sunday specials following it and dropped a flag at Tuxedo, intending to pull into the long middle siding at Sterlington Junction. A freight being found on the west end of that siding, this train was forced to go to the east end and back in. It had stopped and switches were thrown to back in just as the special came around that long curve at full speed. The engineer had received a clear block and, I presume, had been notified that a freight had just pulled in on the middle track. When he saw the freight standing at the west end he supposed all was clear and was doing his best to make up the few minutes that he was late, when he found a second flag from the freight that was backing in, by which he was stopped at a safe distance. Suppose the conductor of that train had not dropped the second flag, would you have laid all the blame on the conductor or would you have held the block and the engineer of the special equally responsible for the disaster that would have resulted?

While the Erie is in advance of most roads on many important points in this department of its service, it still retains the flagging rules. No American road has yet been bold enough to place complete dependence upon its block signals, and the Erie therefore is not behind any of its neighbors in this respect. The fact remains that engineers stretch the liberty given them by a caution signal, as long as flagging is required, and flagmen neglect their duty more or less as long as block signals are used; and there ought to be a more vigorous remedy applied to this unsatisfactory state of things.

The apportionment of the blame in the case cited cannot be discussed intelligently without knowing what were the instructions given the flagman first dropped off. Did he personally tell the engineer of the passenger train to run cautiously, or did he communicate with the block signal operator, and get him to shoulder a part of the responsibility? Was the passenger runner informed that a freight would pull in at the first end of the turnout? If so, the conductor should have insisted on pulling in. If he could not make the other train move, he was doing no more than his duty to put out a second flag, for in going further on the main track than he had said he would, he would deceive the passenger runner. If the passenger runner had been notified that the freight would back in at the further end of the turnout he was to blame for not approaching that point carefully. If the block operator signalled to the passenger train that the block was occupied he should have indicated the fact that there were two trains to be looked out for. If he had no means of doing this the rules were probably at fault, and the superintendent would have to fall back on the injunction to "always take the safe course." This case strongly emphasizes the danger of having two men charged to execute the same order. Where freight trains have to set off midway of a block the conductor should notify the block operator when he has cleared the main track, and should have an electrical connection to enable him to do this. To let following trains in under a simple caution signal will involve risk unless cautionary speed through the whole block is enforced.

Annual Report.

St. Paul & Duluth.—General results are as follows:

	1888.	1887.
Earnings—Freight.....	\$394,791	\$396,025
Passenger.....	1,088,779	1,257,813
Total, including miscellaneous.....	\$1,524,918	\$1,683,339
Operating expenses and taxes.....	1,197,483	1,172,250
Net earnings.....	327,435	522,080

Other charges against income bring the net railroad income down to \$233,558, against \$492,880 in the previous year. To this is to be added land and stumpage income of \$367,946. Interest on bonds amounted to \$71,491; dividends on preferred stock (7 per cent.) to \$375,459.

As compared with railroad income alone, the results for the year show a decided deficit. The St. Paul & Duluth is peculiar in having a large and valuable land grant yet unsold; and it is perplexing to know how far the receipts from this source, sometimes larger than the net earnings of the railroad itself, should properly be classed.

Capital account is as follows:

Stock—Common.....	\$4,000,207
Preferred.....	5,375,910
Funded debt.....	3,065,000
Floating debt.....	754,504
Stumpage income (actual and deferred).....	253,715
Current assets.....	1,192,291
	\$15,332,629

A new management came into control last June, and a number of changes have been made in methods. It is therefore a little hard to say how much of the loss as compared with the previous year is due to this course, how much to the short wheat crop, and how much to the loss of the traffic of the St. P., M. & M., which has built a line of its own parallel to that of the St. Paul & Duluth. Still less is it possible to draw definite references as to the immediate future.

A private letter from China confirms the reports received by cable that work has been stopped on the extension of the China Railway Co.'s lines to Tungchow, near Peking. About the end of January the field party, which had located 45 miles out of the 63 miles in the extension, was ordered to stop work at once and return to Tientsin. The recent fire in the palace at Peking was seized upon by the party in opposition to the railroads as one pretext, they having stirred up the notion that this fire was to be attributed directly to the malign influences which followed the introduction of railroads. Some 200 petitions had also been sent in by boatmen, cartmen and others, saying that the line would ruin them. The result is that the project for the extension is at a stand-

still, and it is feared that Viceroy Li will be unable to set it going again for months, and perhaps for years. The Empress and the Seventh Prince favor the railroads, but the opposition at court is very great and the Seventh Prince being ill, the opposition now has its own way.

It is feared that if the Prince should die not only would further extension of the railroads be prevented, but that those already in operation would be torn up. The officials opposing the railroads are ignorant, and choose to remain so, not one of them having taken the trouble to inspect the lines opened and at work. Our correspondent thinks that Mr. Wharton Barker must have learned by this time that it is one thing to make agreements with such a jelly-like government, but quite another to enforce them, and that he could hardly be warranted in investing money in railroad building in that country unless the United States Government could be induced to enforce his claims when they are disregarded. All of the foreign ministers except the Russian are very reluctant to take any decided position in protecting the business interests of the subjects of their governments in China, the English no less so than others, and the Chinese are not at all scrupulous in guarding the interests of foreigners. Indeed, our correspondent calls them bad names, and after years of experience holds strongly to the opinion that the officials need to be browbeaten before one can get justice or fair dealing at their hands.

The discipline on the roads in operation is represented as being very bad, except where Europeans or Americans are in direct personal charge, and the officials are so opposed to foreigners that it is impossible to keep a large enough staff to carry on the lines in a business-like manner. The feeling against the railroads is so great that the officers of the company have been repeatedly threatened with assassination, even in the petitions which have been sent in to the government. Our correspondent asks us to warn Americans from going to China without having an agreement with some reputable firm. To go there in search of work, he says, would be simply madness. The Chinese lower classes are spoken of as "sturdy, quiet, lazy, good fellows," and under a good government would be valuable workmen and very easily managed, but the conceited and ignorant officials cause all manner of trouble to those who are attempting to carry on railroad operations in the country, and it is doubtful if much of permanent value can be accomplished until something like a revolution takes place in the temper of the government.

Commissioner Fink has issued to the connections of the trunk lines, and to all roads in trunk line territory, a circular setting forth the conditions under which the trunk line roads will hereafter participate in through tariffs and rates. The document is a carefully prepared statement of the general principles embodied in the new trunk line agreement, as recently published. It states that it has been agreed that all joint tariffs must hereafter be fully and formally agreed to before being put into effect, and that authority heretofore given by one road to another permitting the latter to vary through rates without consulting all the roads interested, is now revoked. The trunk lines will not be parties to contracts with shippers lasting more than ten days. They will not honor bills of lading which are at variance with the agreement, and will collect full rates in spite of such defective bills of lading. Joint traffic arrangements will not be continued with any road which refuses to submit all billing to the officers of the Inspection bureaus. All existing contracts, agreements or understandings conflicting with the new agreement are annulled. It has been agreed to form a "Joint Committee," and all connecting roads and transportation lines which do any joint business whatever with the trunk lines are invited to become members of it. By this action all the small roads and Lake lines are virtually given the full benefit of the trunk line organization for maintaining rates and suppressing unlawful practices. The Southern Railway and Steamship Association has passed resolutions similar to those of the trunk lines. So far as rates are concerned, the practice of the Trunk Line Inspection Bureau will be followed in Southern territory. That is, the association road first receiving traffic from connecting lines will not only correct any wrongful or illegal rates, but will raise both advanced charges and freight charges when deemed necessary to protect the integrity of established tariffs. The rule will be insisted upon in the case of prepaid shipments as fully as in other cases.

The importance of these notices lies chiefly in the fact that they will insure much more responsibility than before in the matter of rate-making. Where the agent of one party could use his discretion, each connecting road could shift the responsibility upon another, and none finally bear it. Where all are necessarily responsible, none can disclaim the burden. Any chance for evasion of this responsibility is still further limited by the provisions for termination of old contracts and for efficient inspection of records.

Fifteen months ago the State Railroad Commissioners of Minnesota issued an order putting in force the state law requiring the upper berth to be closed unless it is actually occupied. At that time we expressed our doubts of the constitutionality of such a law, and of the practicability and desirability of any attempt at such minute regulation of the conduct of railroad matters. A decision has just been rendered in the case of the appeal of the Minneapolis & St. Louis from the order of the Commission. The Court decides in favor of the road, holding that a person may purchase a berth or a whole section in a car and occupy it, but if he purchases one berth only he is not entitled to the whole section, and it is evident that lowering the upper berth, even if not occupied, will not cause the occupant of the lower berth any more discomfort than if it were occupied.

The case will be carried to the Supreme Court. Until further orders, therefore, Minnesota travellers will be obliged to push up the upper berth and squabble with the porter about it. While we trust that the Supreme Court will sustain the decision of the lower court we consider it short-sighted on the part of the sleeping car companies to continue a regulation so annoying and profitless.

Mr. M. N. Forney, after years of valuable service, has presented his resignation of the office of Secretary of the Master Car-Builders' Association, and this time there seems to be no doubt that a change will be made. The office has been offered to Mr. John W. Cloud. Should Mr. Cloud accept it the Association would have little or no reason to regret the change in secretaries. Mr. Cloud's activity and influence in the affairs of the Association have given him ample knowledge of all the details of its work and wide personal acquaintance. Mr. Forney could not have a better successor.

TECHNICAL.

The Lulea-Ofoten Railroad.

Those of our readers who have seen Mr. Sandberg's railroad map of Sweden will remember the Lulea-Ofoten Railroad, which is to extend from Lulea, at the head of the Gulf of Bothnia, northwesterly across the arctic circle, to Victoria Haven, at Ofoten, on the Arctic Ocean. This road is building by the Swedish & Norwegian Railway Co., of London, and the principal object in its construction is to take the iron ore from a group of remarkable mines to the seaport. The Engineer of March 15 gives the most recent information concerning the road. It is expected that it will be completed in 1890. The country on the Norwegian side is exceedingly rough. The line crosses the boundary between Norway and Sweden, about 26 miles from Ofoten, at an altitude of 1,700 ft. above the sea, and the mountain slope is very rugged. The average grade is 95 ft. per mile (1.8 per cent.), descending in the direction of the traffic. The harbor is commodious and well sheltered.

There are about 900 laborers, chiefly Norwegians and Swedes, now on the work. The cutting is almost entirely in rock, and about 3 tons per week of Nobel's dynamite are consumed. During the summer, from May to August, when there are nearly 24 hours of daylight, the work is carried on in double shifts day and night. In the winter, during the darkest period, the men work from 6 to 8 hours daily in open rock cuttings, and in but few instances was the work suspended on account of snow. The average temperature in the winter is 54½ deg. Fah. The snow is dry and does not pack hard. Victoria Haven is open to navigation the year around, the temperature of the water being very much modified by the Gulf Stream. On the eastern side, however, the ports of the Gulf of Bothnia are closed for about one-third of the year.

The Chignecto Marine Railway Company.

The company formed to construct this application of the late Captain Eads' plan for passing ships over land by railroad, instead of by canal, issues a prospectus in the London papers of March 18 and 19, from which we learn that Sir John Fowler and Benjamin Baker, with Mr. H. G. C. Ketcham, of Fredericton, are to be the engineers.

The share capital is divided into £300,000 preferred shares and £100,000 common. The preferred shares to have 7 per cent. cumulative, after which the common shares are to receive 7 per cent. The Dominion Government guarantees an annual subsidy for 20 years, payable half yearly, of \$170,602, as long as the capital does not earn 7 per cent., after which excess earnings are to be divided between the Government and the shareholders. The company is also authorized to issue £700,000 5 per cent. bonds.

The railroad, which will be 17 miles long is expected to save from 300 to 500 miles for vessels that would have passed through the Straits of Canso, and 700 miles for those that would have rounded Cape Breton, and the total sum to be estimated at 2d. per ton on cargo and 6d. per ton on hulls. The directors have contracted with Messrs. John G. Meigs & Son, contractors in the Argentine Republic and elsewhere, to complete the work for the share and debenture capital; the contractors to pay interest on preferred shares during construction.

International Congress of Applied Mechanics.

There will be held at Paris during the Exposition an International Congress of Applied Mechanics. The president of the committee on organization is M. Phillips, ex-inspector general of mines (retired). The five members appointed from the United States are: Messrs Robert Grimshaw, R. H. Thurston, Professor Egleston, and the Presidents of the American Societies of Civil and of Mechanical Engineers.

At this Congress, among the important subjects submitted for discussion are the unification of the horse-power; the choice of materials in machine construction; the mechanical production and utilization of artificial cold; transmission to a distance, and distribution of work, by other means than electricity (water, air, steam, cables, etc.); automatic cut-off engines with several successive cylinders; thermo-motors other than the steam engine. Other topics treated by papers will be improvements in steam engines since 1878; progress among associations of owners of steam appliances; and improvements in apparatus for the generation of steam (more particularly sectional boilers).

Operating Bridge Draws by Electricity.

Mr. Fred H. Whipple writes as follows to the *Electrical World*: "I notice in a recent issue an article concerning the turning of an iron draw at Bridgeport by electricity, in which it is said that it is believed to be the first of the kind in the country."

"I think perhaps that I may claim the credit of having prepared plans for the first draw turned by electricity. The Milwaukee Bridge & Iron Co., over a year ago, contracted with the city of Detroit to build a bridge over the American channel of the Detroit River to Belle Isle, a pleasure resort owned by the city. The contract called for the draw to be turned by steam, but at the request of the Milwaukee Co., and in accordance with a change made by the City Council, I prepared plans by which the draw of 300 ft. in length is turned by an electric motor of 10 h. p. Everything works satisfactorily, despite the statements of some electrical engineers that it was inadvisable for the work to be done by electricity."

Air Brake Register.

The automatic air brake register which was illustrated and described in the *Railroad Gazette* of Oct. 5, 1888, the invention of Mr. Robert Potts, Foreman of Car Repairs, Michigan Central Railroad, is manufactured and sold by the P. H. Griffin Machine Works, of Buffalo, N. Y. It will be remembered that this device consists of a head sliding with some

friction along a bar marked in inches indicating the stroke of the air brake piston. This bar is attached to the under sides of the car sills, so that when the brake piston is home and the brake completely released the sliding head or indicator touches the air brake cross head, and at the same time stands at zero on the scale. When the brake is applied the cross-head pushes the sliding head forward, and thus indicates correctly the stroke of the piston.

The Eiffel Tower.

The Eiffel tower reached its full height, 1,178 feet, March 31. A newspaper correspondent who went to the top says that the ascent by the staircase took 40 minutes, and by elevators it is to be made in five minutes. It is expected that the electric light on its top will enable one to read a newspaper at a distance of seven miles.

THE SCRAP HEAP.

Notes.

The Guarantee Company of North America has lately secured the conviction and imprisonment of two defaulters under its bonds. One is James P. Neary, embezzling cashier of the Mutual Union Telegraph Co. at Boston, who was sentenced to three years imprisonment; the other is Rudolph F. Kiste, defaulting ticket agent of the California Southern road at Los Angeles, who will serve a term of eighteen months in the state penitentiary.

Twenty-five switchmen, comprising the whole night force in the Chicago & Northwestern yards at Milwaukee, struck last week and all freight traffic was brought to a standstill. An objectionable man had been appointed night yardmaster.

A fire broke out in the Baltimore & Potomac Railroad freight yards in Washington Sunday morning last, and destroyed 320 barrels of oil and eight freight cars. Its origin is believed to have been from spontaneous combustion.

Low Wages.

Part II. of the Administration Report on Indian Railways, states among other things that considerable progress is being made in the training and employment of native drivers and shunters. The East Indian road employs over 1,400 native firemen and others, and on the North Western native drivers are exclusively used over 500 miles of road. Their use leads to considerable economy, as the wages of a fireman commence at 3½ annas per day, that of a switchman at 7 and a driver at 10. As the director of our mint, Dr. Kimball, determines the value of the rupee as 33.2 cents and there are 16 annas to the rupee, the wages mentioned are about 7, 14 and 20 cents per day.

Victorian Railroads.

Mr. Spaight, the Chief Commissioner of the Victorian Government Railways, has recently been in England on a visit, and the *Railway News* publishes some information gathered from an interview with him. The mileage opened in the colony is over 2,000 miles, and there are 400 to 500 miles under construction, and some three or four additional contracts will be let during the year. The system is mostly single line, but for short portions of the main routes between the principal cities there is second track. The standard gauge is 5 ft. 3 in. For a portion of the colony of South Australia the gauge is 3 ft. 6 in., and in New South Wales it is 4 ft. 8½ in., consequently the colonial roads are at a considerable disadvantage for through traffic. The new carriages being provided now are long, with bogie wheels, but the English style of compartment is adhered to. The average running speed is not less than 35 miles an hour, and in some cases, such as the through express to Adelaide and Sydney, the running speed in certain parts of the journey is as high as 60 miles an hour.

To Refrigerate Passengers.

According to the *Indian Engineering* there is a field for the refrigerator men in India. The method of cooling coaches by wet mats is said to be not only useless when trains are standing at stations, but the dampness is relaxing, and, to some people, injurious. It is proposed to have special saloon carriages, cooled with blocks of ice placed in a separate compartment, over which the air passes before entering the saloon. The floor, sides and roof of the carriage are to be double, as well as the few windows which are allowed in it.

New Ships.

The New York, Philadelphia & Norfolk has purchased the large British screw steamer "Canton," which has deck accommodation for 30 cars, and will hereafter ply between Norfolk and Cape Charles. The same company placed a contract last week for another vessel with the Harlan & Hollingsworth Company, of Wilmington, Del., the ship to be completed by October.

The iron twin-screw passenger steamer "Sandy Hook" was launched at the yards of the Hollingsworth Company March 14. The vessel was built for the Central of New Jersey and will carry passengers between New York and Sandy Hook. She is 260 ft. on water line with 37 ft. beam and 15½ ft. in hold. She greatly resembles the "Mammoth," which ran between Sandy Hook and New York last summer, but she is expected to make faster time.

A Strictly Fresh Joke.

Conductor—How old is your boy, madam? Mrs. Cohnstein—He vos eighd last Chune. Conductor—(suspicious about the half fare)—He looks a great deal older than that. Mrs. Cohnstein—Ach! Der poor liddle feller hes het lots ohf drouble.—*Time*.

The Iron Trade in the United States and Europe.

The table of weekly capacities of the furnaces in blast in the United States, published in last number of the *American Manufacturer*, enables us to make a comparison of our iron production for the last four years, as below. Capacity of furnaces in blast on the first of the months mentioned, tons:

	1886.	1887.	1888.	1889.
January.....	79,051	127,690	140,720	124,167
February.....	93,780	136,255	127,156	134,820
March.....	91,709	135,173	117,579	142,734
Average for three months.	88,180	133,036	125,152	133,907

These figures do not indicate any marked reduction in make of pig iron for this year, though, as they merely give the capacity of furnaces in blast on the first of the months named, they only present approximations to the amounts actually made. Only 511, or about 53 per cent., of our blast furnaces are in blast.

The comparison by fuels for the last three years is as below:

Furnaces in Blast.						
	March 1, 1887.		March 1, 1888.		March 1, 1889.	
	Weekly		Weekly		Weekly	
Fuel.	No.	capacity.	No.	capacity.	No.	capacity.
Charcoal.....	61	11,572	62	11,713	59	11,568
Anthracite.....	142	39,767	102	29,066	100	33,383
Bituminous.....	146	83,834	129	76,800	152	97,783
Total.....	349	135,173	293	117,579	311	142,734

All of the iron made has not passed into consumption; the stock of pig-iron is increasing, and is larger than for some months, though not so large as a year ago, and the prices of

most grades have weakened, as is shown by the prices at Pittsburgh at the dates mentioned:

	Neutral mill.	All ore mill.	Foundry coke ore.	Bessemer.
Jan. 4.....	\$15.25	\$16.00	\$17.00	\$17.00
Feb. 15.....	14.25	15.50	16.50	16.25
March 15.....	14.80	16.25	16.75	16.75

And the lower price of iron, which has fallen \$1.00 or \$1.25 since a year ago, has dragged the wages down. Coke is slightly higher than last year.

In Great Britain, on the contrary, they are for the first time in several years making a marked reduction in their enormous stock of pig iron. The cost of both iron stone and coke is higher, and wages in all branches of the iron trade are increasing through the operations of the sliding scale and threats of strikes, and there is a fair prospect of still further increase.

The Board of Trade returns for the first two months of this year, as compared with the first two months of last, show an increase of 9.3 per cent. in imports and 4 per cent. in exports. The total exports of iron, however, have decreased 1.4 per cent. in quantity and increased 2 per cent. in value. The items of largest increase in value are: Manufactures of steel or steel and iron combined, 55.1 per cent.; steam engines, etc., 23.3 per cent.; tin plates, 19.6 per cent.; and pig iron 21.7. And there has been a decrease in value of railroad iron 21.2 per cent., old iron 18.2 per cent., and steel rails 21.8 per cent. In all the classified items of exports in the iron trade there has been a decrease of exports to the United States except in old iron, machinery, tin plates and cutlery.

The increased use of iron in England is seen to be due to domestic consumption. A great deal of this increased consumption is due to the prosperity of its shipbuilding industry. 902,773 tons of iron and steel ships were launched in 1888, as compared with 790,811 in 1887 and 480,000 tons in 1886. The iron and steel ships built there in 1888 must have required about 530,000 tons of iron and steel in its various forms, and at the commencement of this year 811,466 tons were in course of construction against 439,335 tons at the commencement of 1888.

In Germany, and to a more moderate extent in Belgium, there has been a decided increase in the prices of iron, while the Austrian market is firm. This leaves the United States the only one of the great producing countries in which the iron trade is depressed, and we seem to be very near the bottom of prices, though the indications are that we will do a large volume of business at low prices before any material advance is made in the market rates.

Ship-owning at Cleveland, Ohio.

The Cleveland Plain Dealer prints a table showing the increase of Cleveland's fleet for the last 10 years. In 1879, 184 boats were owned there with a gross tonnage of 62,437 tons; now 242 boats measuring 164,645 gross tons are documented from that port. Of these 110 depend on sails, 116 are wooden and nine iron steamers; the remaining seven are barges and yachts. Ten years ago 128 sail and 56 small steam boats were owned there. Cleveland has long been one of the principal ship building ports on the lakes, its receipts for the past few years ranging from \$2,000,000 to \$3,500,000 from that industry, and they have apparently put a large portion of this money into vessels as the value of their fleet at present is said to be very near \$10,000,000.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Delaware, Lackawanna & Western, quarterly 1½ per cent., payable April 20.

Evansville & Terre Haute, quarterly 1½ per cent., payable April 22.

St. Louis & San Francisco, quarterly 1 per cent., on preferred stock, payable April 15.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 9.

Cairo, Vincennes & Chicago, special meeting, Cairo, Ill., April 25.

Cleveland, Columbus, Cincinnati & Indianapolis, special meeting, Cleveland, Ohio, May 15.

Lake Shore & Michigan Southern, annual meeting, Cleveland, O., May 1.

Long Island, annual meeting, Long Island City, N. Y., April 9.

Louisville, Evansville & St. Louis, special meeting, Mt. Vernon, Ill., May 20.

Michigan Central, annual meeting, Detroit, Mich., May 2.

New York Central & Hudson River, annual meeting, New York City, April 17.

Steinway & Hunter's Point, annual meeting, New York City, April 26.

Toledo, Ann Arbor & North Michigan, annual meeting, Toledo, Ohio, April 17.

Valley (Ohio), annual meeting, Cleveland, Ohio, April 17.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Association of North American Railroad Superintendents will hold its spring meeting at 46 Bond street, New York City, April 8.

The General Time Convention will hold its next meeting at the Hotel Brunswick, New York City, April 10.

The Train Dispatchers' Association will hold its second annual convention in Indianapolis, Ind., June 12. E. J. Peabody, 237 Franklin street, Chicago, is Secretary.

The American Railway Master Mechanics' Association will hold its next annual convention at Niagara Falls, be- ginning Tuesday, June 18, with headquarters at the International Hotel. All who wish to secure rooms should apply to Mr. A. H. Gluck, Manager, International Hotel, Niagara Falls, N. Y.

The Master Car-Builders' Association will hold its next annual convention at Saratoga Springs, N. Y., June 25. Hotel accommodations may be secured by applying to H. S. Clement, Manager Congress Hall.

The Association of American Railway Accounting Officers will hold its next meeting at Niagara Falls, N. Y., in July.

The Traveling Passenger Agents' Association will hold its next meeting in Plank's Hotel, Mackinac Island, Mich., July 9.

The Roadmasters' Association of America will hold its seventh annual convention at Denver, Colo., Sept. 10.

The New England Roadmasters' Association will hold its next meeting in Boston, August 21.

The American Association of General Passenger and Ticket Agents will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The National Association of General Baggage Agents will hold its next meeting at Detroit, Mich., July 17.

The National Association of Railway Surgeons holds its annual convention in St. Louis, Mo., May 2, 1889.

The New England Railroad Club meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The Western Railway Club holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The New York Railroad Club meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The Central Railway Club meets at the Tift House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The American Society of Civil Engineers holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, New York.

The Boston Society of Civil Engineers holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The Western Society of Engineers holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The Engineers' Club of St. Louis holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The Engineers' Society of Western Pennsylvania holds regular meetings on the third Tuesday in each month, at 7:30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.

The Engineers' Club of Kansas City meets at Kansas City, Mo., on the first Monday in each month.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., at 7:30 p. m. on the third Saturday in each month.

The Civil Engineers' Club of Kansas holds regular meetings on the first Wednesday in each month at Wichita, Kan.

Association of North American Railroad Superintendents.

The seventeenth meeting of the association will be held at 46 Bond street, New York City, on Monday, April 8, 1889, at 11 o'clock A. M. A full attendance is particularly requested, as it is expected that matters of great importance will be brought up affecting the work and organization of the association. A cordial invitation is extended to all railroad superintendents to attend this meeting, and solicit others to attend, and if not members, to present their applications for membership.

Central Railway Club (Buffalo).

At the last regular meeting of this club, about 30 members were present. They discussed deadwood and defects for which car owners are responsible.

Several new members were elected. Messrs. Kirby, McKenzie, Lentz, Potts and Turrell were appointed a committee to prepare a paper on owners' defects to be discussed at the next meeting.

A committee consisting of Messrs. McKenzie, Petrie and Lentz was appointed to prepare a paper on drawheads, and Messrs. Griffith, Macbeth and McKenzie were designated to present a paper on certain locomotive details.

The next meeting of the club will be held in May.

Civil Engineers' Club of Cleveland.

The annual meeting of this club was held March 12 and the annual banquet March 14. At the annual meeting the following officers were elected: President, W. R. Warner, Vice-President, H. C. Thompson; Treasurer, S. J. Baker, Secretary, James Ritchie; Corresponding Secretary, A. H. Porter; Librarian, J. L. Gobeille; Member of the Board of Managers of the Association, W. H. Searles. A vote of thanks to the retiring officers was passed. At the annual banquet 75 members and guests were present.

Engineers' Club of Philadelphia.

A regular meeting was held March 16, 1889, Vice-President Arthur Beardsley in the chair; 30 members and 4 visitors present. Mr. J. E. Codman presented notes on a test of riveted steel and iron plates, exhibiting the test of specimens. The iron specimen parted by fracture of the plate, and the steel specimen by shearing of the rivets:

Proportions of Joints.

Thickness of plate..... Iron. Steel.

Diameter of rivets..... 2t 2t

Pitch of rivets in line..... 9.3t 8.7t

Distance apart of pitch..... 4t 3t

Distance apart from edge of plate..... N 3t 2.7t

Dimensions and Stresses.

Iron plate, iron rivets punched holes, hydraulic riveting. Fractured plate.

Plates, width and thickness..... 6.06 in. x .38 in. 6.51 in. x .391 in.

Plates: sectional area, gross..... 2.645 sq. in. 2.548 sq. in.

Plates: strength as found by coupons on each plate..... 48,350 lbs. per sq. in. 57,128 lbs. per sq. in.

Stress on joint, total..... 81,800 lbs. 98,900 lbs.

Stress per square inch, gross area of joint..... 30,926 lbs. 38,815 lbs.

Plates: sectional area, net..... 2.01 sq. in. 1.913 sq. in.

Stress per square inch: net area of plate..... 40,700 lbs. 51,700 lbs.

Rivets: diameter, number and area..... .75 in. -4-1.767 sq. in. .75 in. -4-1.767 sq. in.

Shearing stress per square inch of rivet area..... 46,300 lbs. 55,970 lbs.

Ratio of joint to solid plate, per cent..... 64 70

Shearing strength of rivets compared with tensile strength of net section of plate, per cent..... 64 70

Prof. L. M. Haupt presented some notes upon the permeability of cements and mortars, with a view of bringing out a discussion of this subject. He quoted from the recent report of the Board of Experts on the Washington Aqueduct Tunnel. That report says:

"If all of the work could and would be faithfully fulfilled in accordance with the later specifications requiring backing by masonry laid in cement mortar, it would make the tunnel reasonably water-tight; yet it would not prevent all leakage absolutely, and it is difficult to foretell how much water would pass through.

"The head of the water in the tunnel varies from about 75 to 175 ft., and the pressure due to this head from 32 to

76 lbs. per square inch. This is an internal pressure, tending to burst the tunnel outward—a direction of force which the tunnel lining is not well adapted to resist; and in an inelastic material like brick or cement cracks are liable to be developed on the least yielding—which would be almost inevitable if any weak points were left in the filling. But even if it were all filled it must be remembered that both brick and cement are permeable to water. Mr. James B. Francis made some recent experiments on the percolation of water through cement mortar, a record of which was presented to the American Society of Civil Engineers May 16, 1888. These experiments showed that about 17¼ gallons of water per square foot of surface passed through a thickness of nearly 16 in. of cement in 24 hours under a pressure of 77 lbs. per square inch.

"Mr. Stauffer's experiments, made in the Dorchester Bay tunnel, serve to throw light on the leakage through brickwork. He constructed a bulkhead of brick, laid in cement, 4 ft. thick, in a tunnel 10 by 10 ft. He found that under a pressure of 72 lbs. per square inch the water percolated through at the rate of 120,000 gallons per day, or 1,900 gallons per square foot.

"The experience on the Boston main drainage works proved that it was not practicable to build brick masonry that was water-tight under a pressure of 64 lbs. per square inch.

"At the new Croton reservoir, New York, water under 36 ft. head was found to percolate through 25 in. of brickwork and 4 ft. of concrete."

There was some discussion by Mr. Arthur Marichal and others. Mr. Marichal said that the imperviousness of cements is a question of the greatest importance; yet it seems that no steps are taken by manufacturers to improve their products in that direction. The fineness is one of the most important considerations, and wherever percolation is prejudicial—as is the case in aqueducts subjected to pressure, in dams, and in works exposed to sea water—care should be taken to select a very finely ground cement. The manipulation of the mortar will also affect its imperviousness.

When asked whether it was possible to make cellars water-tight by means of cement, if the level of the water was, for instance, generally a couple of feet above the floor, Mr. Marichal answered that some years ago he succeeded in rendering perfectly water-tight, by means of cement, some cellars which used to contain about 6 ft. of water. He then described the process of construction, some discussion of which followed, by Mr. Howard Murphy and others.

General Time Convention.

The spring meeting of the General Time Convention will be held at the Hotel Brunswick, New York City, on Wednesday, April 10, 1889, at 11 a. m. Reports will be presented by the following committees: Executive Committee; Committee on Car Mileage and Per Diem Rates; Committee on the Code of Standard Train Rules and Rules for the Movement of Trains by Telegraphic Orders. The annual election of officers will take place at this meeting, and several proposed amendments to the "Rules of Order" will be acted upon, including the proposition to change the name of the organization.

Montana Society of Civil Engineers.

A regular meeting was held March 16. The Committee on Highway Bridges reported on the law proposed by the Engineers' Club of Kansas City, expressing the opinion that the act is a good one, but that Montana is too new a country to be benefited by such a law at the present time. The committee recommended that the secretary be instructed to say to the Kansas City Club that the society is in full sympathy with that club in this movement, but doubtful of the expediency of attempting to secure legislation now in Montana. The report was adopted. The secretary was instructed to express to the Engineers' Club of Kansas City the hearty co-operation of the Montana Club in the movement toward arrangements for the transfer of membership among the different societies, and to state that the details of the scheme would be left to the determination of the Board of Managers of the Association.

New England Railroad Club.

The regular monthly meeting of the club will be held on Wednesday, April 10, at 7:30 p. m. The subject for discussion is "The Compound Locomotive."

Northwest Railroad Club.

A meeting of the club was held on Friday evening, April 5, at 7:30, in the Directors' room at the St. Paul Union Depot. The subject for discussion is "Freight Car and Tender Trucks," opened by Mr. E. A. Westcott.

PERSONAL.

—Mr. Asa W. Kellogg, Commercial Agent of the Southern Pacific at Cincinnati, committed suicide in the Southern Hotel at St. Louis, last week.

—Ex-Gov. John C. Brown has resigned the Presidency of the Texas & Pacific Railroad, having been elected President of the Tennessee Coal, Iron & Railroad Co.

—Mr. T. Appleton has resigned his position as Secretary of the Elastic Nut Co., of Milwaukee, Wis., to become Resident Engineer of the Union Pacific. He was formerly Principal Assistant Engineer on the Chicago, Milwaukee & St. Paul.

—Mr. E. P. Allis, the head of the Reliance Iron Works at Milwaukee, one of the largest foundries and machine shops in the country, died very suddenly April 1. He was a man of cultivated tastes, a liberal patron of the arts and had amassed a large fortune.

—General Manager J. T. Harahan, of the Chesapeake & Ohio was last Saturday called to Louisville, Ky., and presented with a handsome silver service, gold watch and chain, and an elegant masonic emblem for a charm, by his former associates and employes of the Louisville & Nashville.

—Mr. M. L. Sargeant, who has been General Freight Agent of the Kansas City, Fort Scott & Memphis since 1882, has been appointed Traffic Manager of the system. Mr. Sargeant was formerly Assistant General Freight and Passenger Agent of the Central Branch division of the Missouri Pacific, and he has also held important positions in the traffic department of the Atchison, Topeka & Santa Fe.

—Mr. Coe F. Young, for many years Vice-President and General Manager of the Delaware & Hudson Canal Co., died at Thomasville, Ga., March 22, at the age of 65. He was appointed Superintendent of the canal department of the company in 1865, and five years later became General Manager of the railroad and canal systems, which position he held until three years ago.

—Mr. Joseph M. Griggs, General Ticket Agent of the Boston & Albany for about 24 years past, has resigned, and is succeeded by his son, George B. Griggs, who has been in the service for several years. The retiring General Ticket Agent has been in the service of the Boston & Albany and its predecessor, the Western Railroad, for 47 years having begun in 1842. He was for a long time Cashier of the road, and before that was local ticket agent.

—Hon. John Henry Pope, Minister of Railways and Canals for Canada, died April 1, at Ottawa. Mr. Pope was sworn in as a member of the Dominion Cabinet in October, 1871, but retired with Sir John Macdonald in 1873, on the Canadian Pacific Railway question, and with the accession of Sir John Macdonald to power in 1878 he re-entered the Cabinet as Minister of Agriculture, holding that position until he succeeded Sir Charles Tupper as Minister of Railways, in 1884.

—The Postmaster-General has appointed the following Division Superintendents of Railway Mail Service: Norman Parkins at St. Paul in place of Walter A. Butler, resigned; J. P. Lindsey at St. Louis in place of R. M. Thomas, resigned; J. S. Weaver at Fort Worth, Tex., in place of George W. Hunter, resigned. Mr. Parkins has been in the postal service for about 17 years, and has risen by successive promotions to be Chief Clerk at St. Paul. Mr. Lindsey has been in the service about the same length of time, and has also risen by promotions to be Chief Clerk at Kansas City. Alonzo Burt has been appointed superintendent on the 5th division of the Railway Mail Service with headquarters at Cincinnati, O. Mr. Burt was removed from the same position in 1886. It is stated that no further changes will be made in this grade of the service.

—The New Jersey Legislature has before it several bills increasing the authority and scope of its "Board of Assessors" which has charge of the reports exacted from the railroad companies. It has already granted to the Board enlarged powers of investigation of railroad accidents, and the Governor has appointed Mr. Bird W. Spencer to succeed Mr. Edward Bette as one of the four members of the Board. General Spencer is well equipped for the work, having been engaged all his life in railroad service, and for six years Treasurer of the New York, Lake Erie & Western. He resigns the receivership of the Tonawanda Valley & Cuba railroad to accept the new position.

—Mr. James E. Childs, who has been General Manager of the New York, Ontario & Western for the last three years, has resigned that position to become Assistant General Manager of the Lake Shore & Michigan Southern. Mr. Childs entered railroad service in 1865, when he was 17 years old, as an assistant engineer on the New York & Oswego Midland road, now the New York, Ontario & Western. He served as assistant or division engineer on various roads until 1876, when he became Chief Engineer and Superintendent of the Rochester & State Line, in which position he remained until 1881, when he became General Superintendent of the New York, Ontario & Western, and Assistant General Superintendent of the New York, West Shore & Buffalo.

Mr. John B. Kerr, General Counsel of the road, has been appointed Acting General Manager of the New York, Ontario & Western.

ELECTIONS AND APPOINTMENTS.

Alton & St. Louis.—The company this week elected the following directors: John J. Mitchell, T. B. Blackstone and Edward N. Gibbs. President, E. N. Gibbs; Secretary, T. B. Blackstone.

American Midland.—The following officers were elected this week: President, William Thorpe; Vice-President, Davis Johnson; Treasurer, James F. Cox; Secretary, Theodore Fotheringham, all of New York. The office in New York is at 42 New Street.

Annisston, Oxford & Choccolocco Valley.—At a meeting held at Oxford, Mass., last week, the following officers were elected: E. Locke, President; R. J. Riddle, Vice President; T. M. Draper, Secretary; C. D. Woodruff, Treasurer. Directors: R. S. Riddle, W. G. Ledbetter, C. S. Whiteside, W. C. Scarborough, of Anniston; T. C. Hill, D. C. Cooper, of Oxford; L. L. Allen, J. T. D'Arman, of D'Armanville; S. N. Milligan, J. F. M. Davis, of Choccolocco.

Atchison, Topeka & Santa Fe.—N. T. Spoor having been transferred to another department, the office of Assistant Superintendent, Kansas City, has been abolished. W. C. Nixon has been appointed Superintendent of Terminals, with headquarters at Kansas City, in charge of all matters pertaining to the operating department, Argentine to Kansas City inclusive.

Atlantic & Pacific.—F. E. Nelson has been appointed Superintendent of Road Department, with headquarters at Williams, Ariz., and has charge of roadway, bridges, buildings and water service.

Baltimore & Ohio.—President Mayer has issued the following circular: The Second Vice-President, Thomas M. King, will have charge of all questions pertaining to the physical and operating branches of the company's service, and such other duties as may from time to time be assigned him by the President. Reports heretofore sent to the Vice-President, Colonel Orland Smith, on such subjects, will on and after April 1 be referred to the Second Vice-President.

Boston & Albany.—George B. Griggs, for a number of years connected with the general ticket department, has been appointed General Ticket Agent, in place of J. M. Griggs, resigned. This department will remain for the present at Springfield, Mass., but its removal to Boston before long is contemplated.

Campbell Hall Connecting.—The following are the directors of this New York Company: W. W. Gibbs, Philadelphia, Pa.; James W. Husted, Peekskill, N. Y.; Theodor B. Dean, Amawalk, N. Y.; John I. Platt, Poughkeepsie, N. Y.; C. Campbell, Brooklyn, N. Y.; Charles Macdonald, D. J. McNiece, D. O'Dell, O. W. Child, Frank C. Hollins, E. R. Chapman, T. C. Clarke, John C. Stanton, New York City.

Canadian Pacific.—The headquarters of G. M. Bosworth, Assistant Freight and Traffic Manager, have been removed from Montreal, Que., to Toronto, Ont.

Canada & St. Louis.—The following are named as directors in the amended Indiana charter: J. J. Burns, W. R. Gray, J. S. Keefe, E. E. Mummert, T. A. Starr, and W. L. Stumer of Goshen, Ind., and J. S. McNair, of Lincoln, Neb.

Central Arkansas.—The following are the directors and officers of this company, whose incorporation was noted last week: Directors, Amos C. Barstow, W. A. Bradford, H. J. Campbell, J. H. McCarthy and J. R. Campbell. Amos C. Barstow is President and J. L. Campbell Secretary. The company succeeds the Pine Bluff, Monroe & New Orleans.

Chesapeake & Ohio.—Harry Frazier has been appointed Superintendent of Roadway, with office at Cincinnati, O.

Chicago & Alton.—The annual meeting of the stockholders of the road was held in Chicago, April 1. There were polled 134,695 votes out of a possible vote of 175,941, all of which were for T. B. Blackstone, John B. Drake and Morris K. Jesup for the term of three years, and for William N. Blackstone for the term of two years to fill the unexpired

term of his father, Lorenzo Blackstone, deceased. At a subsequent meeting of the directors of the company, T. B. Blackstone was elected President, J. C. Mullin Vice-President, Charles H. Foster Secretary and Treasurer, C. H. Chappell General Manager, Corydon Beckwith General Solicitor, and Chauncey Kelsey Auditor. Annual meetings were also held by the companies under control of the Chicago & Alton.

Chicago & Northwestern.—Perry Griffin has been appointed Acting General Agent at Portland, Or., in place of H. C. Eckenberger.

Chicago, St. Paul & Kansas City.—The following appointments have been announced: E. P. Capen, General Agent Passenger Department, with office at St. Paul; W. P. Cooley, General Agent Passenger Department, with headquarters at Philadelphia, Pa.; E. B. McCuen, Traveling Passenger Agent, with headquarters at Chattanooga, Tenn.; F. H. Lord, General Agent Passenger Department, with headquarters at No. 106 Clark street, Chicago, Ill.; R. S. Hair, General Eastern Passenger Agent, with headquarters at New York City; Frank Harrison, Canadian Passenger Agent, with headquarters at Toronto, Ont.

Denver, Colorado Canon & Pacific.—The incorporators are Humphrey B. Chamberlin, John C. Montgomery, John Hurlbut, Samuel S. Harper, Frank M. Brown, Philip Feldhauser and Benjamin B. Lawrence.

East Tennessee & Western North Carolina.—Frank Firmstone has been elected President of this company in place of A. Pardee, Jr., resigned. The office of the company has been removed to No. 240 Third street, Philadelphia, Pa.

Eldorado Springs.—At a meeting in Nevada, Mo., March 29, the following directors and officers were elected: Col. E. H. Brown, of Girard, Kan.; John T. Morrison, of Pittsburgh; N. K. Elliott, of Indianapolis; H. E. Ashcroft, of Philadelphia; Robert Clymer, of New Jersey, and R. T. Bailey, of Harrisonville. The directors have elected the following officers: E. H. Brown, President; H. E. Ashcroft, Vice-President; John T. Morrison, Secretary, and Robert T. Bailey, Treasurer.

Elmira, Cortland & Northern.—The office of Albert Allen, General Superintendent, has been removed from Elmira to Cortland, N. Y.

Etowah Valley.—The following directors have been elected: P. B. Lawrence (President), John Palmouth, R. B. McClure, Henry Houser, J. F. Castleberry, V. D. Monroe. The office is at 90 Ellis street, Atlanta, Ga.

Eureka Springs.—George West has been appointed Auditor of this company, with office in Eureka Springs, Ark., vice A. H. Foote, resigned.

Georgia Midland & Gulf.—R. H. Screven has been appointed Auditor, with headquarters at Columbus, Ga.

Hancock & Pennsylvania.—The incorporators of this company are: Marvin D. Wheeler, Hancock, N. Y.; James E. Childs, W. F. Dunning, John M. Shedd, John B. Kerr, New York City, John Burton, Garden City, L. I.; James C. Anderson, Englewood, N. J.; Richard D. Rickard, Stamford, Conn.; Arthur L. Parmelee, Elizabeth, N. J.; John Fleming, William J. Martin, Brooklyn, N. Y.; Edward Canfield, Middletown, N. Y.; William S. Martin, East Branch, N. Y.

Hermosa, Hill City & Western.—The following officers have been elected: President, M. R. Maxson; Vice-President and Superintendent of Construction, A. S. Way; Secretary, C. J. Patton; Treasurer, T. L. Monaghan; Auditor, J. Strater, all of Hermosa, Dak.

Hornellsville & Lackawanna.—The following officers have been elected: Benton McConnell, President; Charles Asdit, Treasurer; Irvin W. Near, Secretary, all of Hornellsville, N. Y.

Illinois Central.—Louis G. Sporlein, previously Car Accountant, has been appointed Assistant Freight Auditor, with office at Chicago. William C. Leiferman has been appointed Car Accountant, in place of Louis G. Sporlein, promoted. The headquarters of R. O. Bean, Traveling Passenger Agent, have been removed to Jackson, Miss.

Joliet & Chicago.—The following directors were elected this week: John Crerar, J. C. McMullin, John B. Drake, T. B. Blackstone, J. McGregor Adams. President, John Crerar; Secretary, Charles W. Foster.

Junction.—The annual meeting and election of the shareholders of the company was held in Philadelphia, April 1. The following officers were elected: President, George B. Roberts; Secretary, John C. Sims, Jr.; directors, George B. Roberts, N. P. Shortridge, John P. Green, A. A. McLeod, J. N. Dubarry. Robert W. Smith was elected Treasurer in place of Robert Craven.

Kansas City, Fort Scott & Memphis.—M. L. Sargent has been appointed Traffic Manager, and will have general supervision of the freight and passenger business of this company, and of the Kansas City, Memphis & Birmingham, the Kansas City, Clinton & Springfield and the Current River road. Mr. Sargent's office will be at Kansas City.

H. S. Mitchell has been appointed Division Superintendent, with office at Fort Scott, Kan., in place of E. J. Perry whose office was at Kansas City.

Kansas City & Pacific.—F. C. Stevens has been appointed General Traveling Agent, with office at Parsons, Kan.

Lake Shore & Michigan Southern.—E. A. Handy has been appointed Engineer of Lake Shore Division, with office at Cleveland, Ohio, in place of G. C. Dunham.

Lockport Northern.—The following are the names and addresses of the directors of this New York company: William Spalding, John Dodge, Eugene M. Ashley, Edwin L. Jeffrey, Willard T. Ransom, Frank P. Weaver, Charles A. Hoag, all of Lockport, N. Y.

Louisville & Nashville.—C. A. Davis has been appointed Roadmaster of the Birmingham Mineral Division at Birmingham, Ala., vice Harry Frazier, resigned.

Louisville, St. Louis & Texas.—A. M. McCracken, Superintendent, has assumed the duties of the Chief Engineer, vice J. H. Sample, resigned, on account of ill health. His office will be at Louisville. F. J. Speyer has been appointed Roadmaster between Cloverport and West Point, Ky.

Macon & Birmingham.—The company has organized by electing the following officers: Frank S. Johnson, President; W. A. Doody, Vice-President, and N. M. Hodgkins, Secretary and Treasurer. The offices are at Macon, Ga.

Memphis, Belt & Suburban.—The incorporators of this company are: John Snea, F. J. Collum, George W. Fallahan, H. J. Englesing and H. H. Plant, of Memphis, Tenn.

New York, Ontario & Western.—J. E. Childs having resigned as General Manager of this company, to take the position of Assistant General Manager of the Lake Shore & Michigan Southern, John B. Kerr has been appointed Acting General Manager, and will act in that capacity until further orders.

Northern Pacific.—A. D. Edgar has been appointed General Agent of the freight and passenger departments, with headquarters at Helena, Mont., and will have general supervision of Montana traffic, except to and from Montana Union Railroad points. James McCraig, agent at Butte, Mont., has been appointed General Agent, representing both the freight and passenger departments at Butte, and will have general supervision of traffic to and from Montana Union Railroad points.

J. D. Finn, Superintendent of the Yellowstone division, has been appointed Superintendent of the Montana division, in place of W. McWhite, resigned. Headquarters at Livingston, Mont. F. H. Marsh, Chief Train Dispatcher of the Yellowstone division, has been appointed Superintendent of that division with headquarters at Glendine, Minn., to succeed J. D. Finn.

Oregon Pacific.—The old officers were re-elected at the annual meeting held in Corvallis, Or., March 19.

Panama.—At the annual meeting held in New York, April 1, the directors elected for next year were Gen. John Newton, Charles Coudert, Ernest A. Oppenheimer, Julius M. Adams, Louis de Beban, Robert A. Chesebrough, E. A. Drake, Samuel M. Felton, D. A. de Lima, Samuel Risber Probasco, J. Edward Simmons, D. Lower Smith and Xavier Boyd. The directors organized by electing the old officers.

Pittsburgh, Marion & Chicago.—K. E. Barringer has been appointed Auditor and General Freight and Passenger Agent for this company, with office at New Lisbon, Ohio, vice H. T. Hanna, resigned to accept other service.

Pittsburgh, Wheeling & Kentucky.—C. D. Hubbard, John McLure, Henry K. List, Joseph Speidel, of Wheeling, and William Shaw and Thos. D. Messler, of Pittsburgh, were elected Directors at the recent annual meeting in Wheeling, W. Va.

Pullman Palace Car Co.—John C. Paul has been appointed Superintendent of Equipment in charge of repairs and maintenance of cars, with headquarters at Chicago.

St. Louis, Jacksonville & Chicago.—At the annual meeting in Chicago, April 1, directors and officers were elected as follows: John J. Mitchell, T. B. Blackstone, John Crerar, L. E. Worcester and J. C. McMullin. President, J. C. McMullin; Secretary, W. J. Bryson.

St. Louis, Keokuk & Northwestern.—Mr. C. M. Levey has been appointed General Superintendent of the St. Louis, Keokuk & Northwestern and the Chicago, Burlington & Kansas City roads, with office at Keokuk, Iowa. W. E. Cunningham has been appointed Superintendent of the St. Louis, Keokuk & Northwestern Road, with headquarters at Hannibal, Mo. D. O. Ives has been appointed Assistant General Freight Agent of the St. Louis, Keokuk & Northwestern and Chicago, Burlington & Kansas City roads.

St. Paul, Minneapolis & Manitoba.—L. W. Campbell, now Local Freight of the Chicago, Milwaukee & St. Paul at 70 North Union Street, Chicago, has been appointed General Agent of this company, with office under Pacific Hotel.

Santa Fe Southern.—The following are the officers of this company, a reorganization of the Texas, Santa Fe & Northern: L. M. Meily, President and General Manager, Santa Fe, N. M.; Charles Johnson, Secretary and General Superintendent, Santa Fe, N. M.; Simeon F. Sullivan, Assistant Secretary and Treasurer, New York; Thomas S. Smith, General Counsel, Santa Fe, N. M.

Selma & Cahaba Valley.—The officers of this road are now as follows: Edward G. Gregory, Selma, Ala., President; A. W. Cawthon, Vice-President and Treasurer; L. H. Montgomery, Secretary. The office is at Selma, Ala.

Sinnemahoning Valley.—C. N. Cushman has been appointed Car Service Agent, with office in 35 Chapin Block, Buffalo, N. Y.

Sinslaw & Western.—The officers of this Oregon company are as follows: A. G. Hovey, President; J. A. Straight, Vice-President; W. A. Cox, Vice-President; J. M. Hodson, Secretary, and E. C. Smith, Treasurer. The general office is in Eugene City, Ore.

Southern Pacific.—At a meeting of the stockholders of the company in San Francisco, April 3, the following directors were elected: Leland Stanford, C. P. Huntington, Charles F. Crocker, A. N. Towne, Thomas E. Stillman, W. V. Huntington, F. S. Douty, W. E. Brown, S. F. Gage, Ariel Lathrop and E. P. Miller, Jr. The only change is in the election of T. E. Stillman and A. N. Towne, vice Timothy Hopkins, resigned, and Charles Crocker, deceased. Mr. Hopkins retains the office of Treasurer. Out of \$108,000,000 of stock outstanding, \$100,000,000 was represented.

Staten Island Rapid Transit.—The following Board of Directors was elected at the annual meeting this week: Erastus Wiman, Charles Watrous, A. Horrmann, Louis De Jonge, E. P. Goodwin, N. Marsh, George F. Kreischer, R. M. Galloway, J. H. F. Mayo, William King, C. A. Canavello, J. W. Mersereau and George B. Ripley.

Tacoma Terminal Co.—The trustees of this new company are Herbert S. Huson, Chauncey W. Griggs, Henry Hewitt, Jr., and George Browne, of Tacoma; Thomas F. Oakes, of St. Paul; Robert Harris and James B. Williams, of New York.

Tennessee Coal, Iron & Railroad Co.—At the annual meeting, held April 1, the old Board of Directors resigned and the following were elected: John C. Brown, William Duncan, Napoleon Hill, Enoch Ensley, Sharrell Hill, H. G. Bond, John C. Haskell, Columbia, S. C.; Samuel Cowan, H. Duncan Wood, F. L. Lehman, J. D. Probst, James L. Gaines and C. C. Baldwin. Ex-Governor John C. Brown is the new President of the company, and James Bowron was re-elected Secretary and Treasurer.

Texas & Pacific.—J. L. Griffen, Superintendent of the Transcontinental Division, and J. Kertin, Superintendent of the Eastern Division, having resigned, the divisions have been combined and will be known as the Eastern Division. John Bradley has been appointed Superintendent of the Eastern Division, with headquarters at Marshall, Tex.

Union Pacific.—T. Appleton has been appointed Resident Engineer, with office at Omaha, Neb.

Virginia & Kentucky.—The officers of this company are David S. Peirce, Wytheville, Va.; J. C. Wrenchall, Chief Engineer and General Manager, Danville, Va.; and John C. Friend, Secretary and Treasurer, Danville.

Wabash Western.—H. T. A. Linchey has been appointed Freight Claim Agent, with office in St. Louis, Mo., to succeed H. H. Wheeler.

Wyoming, Salt Lake & California.—In the amended articles of incorporation the following are named as directors: B. Wood, Chester Howe, James E. Fulton, L. C. Karick, Thomas W. Oates, Robert Gardiner, and Theodore Brough.

OLD AND NEW ROADS.

New Companies Organized.—Denver, Colorado, Canon & Pacific.—Hancock & Pennsylvania.—Kinzie Valley.—Peru & Detroit.—Rochester, Beaver Falls & Western.—Tacoma Terminal Co.—Utah & Colorado.

Alabama & Texas.—A charter has been filed in Alabama by this company to build a line from Montgomery in a southwesterly direction, to a point on the Mississippi state line in Choctaw County, a distance of 140 miles.

American Midland.—The stockholders of the New York, Mahoning & Western and those of the Ohio, Indiana & Missouri River road met at Findlay, Ohio, this week, and completed the consolidation of the two roads under the name of the American Midland. After several unsuccessful attempts the New York, Mahoning & Western this week succeeded in crossing the Lake Erie & Western tracks at Findlay, Ohio. Immediately after the Lake Erie fast train passed eastward, a number of men in hiding rushed to the crossing and succeeded in getting the track laid before a switch engine could be brought back to the main track. The work was all done in a drenching rain.

Atlanta & Florida.—Arrangements have been made with the Americus Investment Co. by which that company will build an extension of this road from its present terminus at Fort Valley to Cordele, Ga., where it will connect with the Savannah, Americus & Montgomery, which is controlled by the Americus Investment Co. The line will be about 40 miles long.

Atlantic City.—The articles of consolidation, merging the Philadelphia & Reading branch line in South Jersey into one company under this name, were formally filed last week, the consolidation taking effect April 1. It will have a capital stock of \$2,200,000, of which \$1,000,000 will be preferred stock and \$1,200,000 common; and a bonded debt of \$2,200,000. Details of the consolidation were given last week.

Campbell Hall Connecting.—This company has been organized in New York, with a capital stock of \$450,000, to construct a road commencing at a point on the state line between the states of New Jersey and New York at or near Liberty Corners, Orange County, N. Y., and running thence in a northeasterly direction and terminating at or near Campbell Hall, in the same county. The distance is 15 miles.

Chattanooga Southern.—A telegram from Chattanooga says that ground was broken last week at the line between Georgia and Tennessee for this road, which is to run to McLemore's Cove and to Alpine, Ala., penetrating the important mineral and coal region. The road will connect with the Chattanooga Union at the state line, thus giving it terminal facilities at Chattanooga.

Chicago, Kansas & Nebraska.—Press dispatches state that immediately on the appearance of President Harrison's proclamation announcing that the Oklahoma district in Indian Territory has been ceded to the Government and would be opened to settlers on April 22, engineers of this company started from Topeka to commence the final survey for the extension through the Indian Territory. The company last year built a line from Caldwell, Kan., south to Pond Creek, in the Cherokee country. It is thought this line will be extended this year to Kingfisher in the Oklahoma country.

Choctaw Coal & Railway Co.—The company has increased its capital stock from \$1,000,000 to \$1,500,000 and a new survey is to be made for the line from McAllister, Ind. Ter., to a connection with the Atchison, Topeka & Santa Fe in the Oklahoma country. E. C. Chadick of Denison, Tex., is General Manager.

Chagrin Falls & Southern.—A special meeting of the company was held this week, at which it was agreed that the stock of the company be increased to \$200,000. The stockholders also consented to the issue of mortgage bonds to complete the road, and a lease was agreed upon by which the line will be operated by the Cleveland & Canton road.

Denver, Colorado Canon & Pacific.—This company has filed a charter in Colorado, with a capital stock of \$2,000,000, to build a road from Grand Junction, down Grand River to the junction with the Green River, through Utah, Nevada, California and Arizona to the mouth of Colorado River near the Gulf of California, and thence to San Diego, Los Angeles and San Francisco; also to build a road from the junction of Green and Grand rivers northward, to form a junction with the Union Pacific in Wyoming; and from the city of Grand Junction eastward to the coal fields near New Castle, in Garfield County, Col.

Eldorado Springs.—F. P. Anderson, of Nevada, Mo., has been given a contract to build 30 miles of this road from near Eldorado, Mo., to Rich Hill, Mo. The line has already been graded from Eldorado west for about six miles. Bonds to the amount of \$2,000,000 will be issued. Col. E. H. Brown, of Girard, Kan., is President.

Etowah Valley.—This company has been organized in Georgia to build a road from Gainesville, westerly via Dawsonville, Georgia Marble Works and Kingston to Rome, Ga., a distance of about 75 miles. The route is through a rich mineral, timber and farming section at the foot of the Blue Ridge mountains; this road connects the Richmond & Danville at Gainesville, Ga., with the Marietta & North Georgia at the Georgia Marble Works and with the Western & Atlantic at Kingston, Ga. About 20 miles has been graded and the citizens on the line are taking the stock liberally. P. B. Lawrence, 90 Ellis street, Atlanta, Ga., is President.

Evansville & Richmond.—Contractors have arrived at Richmond, Ind., to begin work on that end of the line. About 12 miles of the line from Elora to Seymour, Ind., is now ready for the track, and work is in progress on the remaining 60 miles east to Bedford and Seymour. The line from Seymour northeast to Richmond, 70 miles, has been surveyed. Three bridges will be needed, the one over the White River near Seymour will have a span 400 ft. long. Oliver Ferguson & Son, of Bedford, Ind., are the principal contractors. J. J. Fairchild, of Worthington, Ind., and Criste & Conkey, of Evansville, Ind., also have contracts on the line.

Farmville & Powhatan.—The stockholders of this company and of the Brighthope road, have approved the proposed consolidation. It is to take effect when 32 miles of the Farmville & Powhatan has been completed ready for operation. The grading has all been completed on this road from its junction with the Brighthope road to Powhatan, Va., 64 miles, and tracklaying will commence this month. When the line to Farmville is completed, the company will operate 96 miles of road, under this name, extending from Bermuda Hundred, Va., on the James River to Farmville.

It is proposed to extend the road from Farmville to a junction with the Lynchburg and Durham at or near Brook Neal, in Campbell County.

Hancock & Pennsylvania.—This company has filed a charter in New York to construct a road, commencing at Hancock Station on the New York, Ontario & Western Railroad, and running thence easterly and southeasterly to the state line between the States of New York and Pennsylvania at a point on the Delaware River opposite Buckingham Township, Wayne County, Pa., a distance of three miles. The capital stock is \$200,000.

Hermosa, Hill City & Western.—All the right of way has been secured for this road, which is to be built from Hermosa, Dak., westerly through the Black Hills region to the Wyoming line. Surveys have been made for a part of the line, and it is expected to let contracts this summer. The grades will be easy.

Hornellsville & West Union.—The company expects to let the contracts very soon for building the road from Hornellsville, N. Y., south 16 miles to a connection with the northern terminus of the Coudersport, Hornellsville & Lackawanna in the town of West Union. The survey has been completed, and it is claimed that enough funds have been secured to build both this road, and the Coudersport, Hornellsville & Lackawanna. When completed these roads will form part of a new line from Coudersport, Pa., via Hornellsville to Rochester, N. Y., and it will cross all trunk lines in New York State. The product of the soft coal mines in Northern Pennsylvania are expected to furnish an important share of the traffic.

Hudson Suspension Bridge & New England.—The company has just completed the survey of a route from the west end of the Bull Hill Tunnel north to connect with the New York, Ontario & Western road. The distance is about seven miles, and will give the New York, Ontario & Western access to the proposed Peekskill Bridge.

Jones Mountain.—It is expected to complete this road from Hudson south to Quarryville, N. Y., 15 miles, within a year. The surveys have been finished, and four miles are in operation, the traffic being from the stone quarries and woolen and cotton mills. The grades on that part of the line from Hudson to Jonesburg, are from 120 to 180 ft., but on the rest of the line they do not exceed 60 ft. per mile. F. W. Jones, of Jonesburg, N. Y., is President and W. Young is Chief Engineer.

Kentucky & Indiana Bridge Co.—In the suit of W. L. Breyfogle to have a receiver appointed for the Kentucky & Indiana Bridge Co., a decision was this week given at Louisville, Ky., refusing the petition. It was also decided that the company might issue the second mortgage bonds agreed upon by the directors.

Kinzua Valler.—This company has filed a charter in Pennsylvania to build a road from Riderville, McKean County, on the New York, Lake Erie & Western, westerly to Morrison Station, a distance of 15 miles. The capital stock is placed at \$140,000. S. S. Bullis, Olean, N. Y., is President.

Lebanon Springs.—In the Circuit Court at Troy, N. Y., last week trial was begun of the suit against the Union Trust Co., of New York, and others, to set aside a foreclosure in 1873 of a mortgage for \$2,000,000 on the road. The plaintiff asks that the owners of the bonds may have a first lien on the road, and the owners of the Harlem extension a second lien.

Lehigh Valley.—It is stated that the company has about completed surveys for an extension of its Harvey's Lake branch to a connection with the L-yalstock road and the Bernice coal fields. The 20 miles of road to be built will pass through a heavily timbered country, which is now without railroad connection.

Lockport Northern.—This company, whose organization was noted in our issues of Feb. 15 and 22, has been chartered in New York, with a capital stock of \$200,000, to construct a road, commencing in the City of Lockport and running thence north about 10 miles to Newfane Station, Niagara County, New York.

Louisville, Hardinsburg and Western.—All the right of way has been secured for this road from Irvington, through Hardinsburg and Falls of Rough to Fordsville, Ky., 40 miles. The surveys have been finished and the contract for building the road has been let to Marshall Morris & Co., of Louisville. There will be a 300 ft. tunnel, but the grades and curves are easy and it is expected to complete the road by Oct. 1, next. B. F. Beard, of Hardinsburg, is President, and C. L. Cornwell, of Louisville, is Chief Engineer.

Memphis, Belt & Suburban.—A charter for this company has been filed in Tennessee. The company is organized for the purpose of constructing and operating a road from a point at or near Magnolia Station, Shelby County, Tenn., on the Kansas City, Memphis & Birmingham, to Raleigh, in the same county, a distance of twelve miles.

Memphis, Little Rock & Indian Territory.—The preliminary survey has been made from Hot Springs, Ark., west toward the Indian Territory line, for a distance of 90 miles. The locating survey has been completed between Little Rock and Hot Springs.

Meridian & Mississippi.—The preliminary survey for this road has just been completed from Meridian, Miss., to Tuscaloosa, Ala., on the Tombigbee River, a distance of 46 miles. Estimates are now being made, and contracts for building the road will probably be let late in the year. Capt. W. H. Hardy, of Meridian, is President.

Mexican National Construction Co.—The final location has just been begun for the line from Zacatecas to Moctezuma, on the main line of the Mexican National, in the State of San Luis Potosi, a distance of over 100 miles. Two, and in some places three, alternate routes have been surveyed for the line between Saltillo and Guadalupe, and the country between Guadalupe and Colima is now being examined in the same way. But 30 miles of road remains to be built to complete the line from the port of Manzanillo to the City of Colima, a total distance of 60 miles. On the line from Zacatecas to Ojo Caliente, but 25 miles remains to be built. Other lines projected by this company were referred to last week under the heading of New Roads. Altogether over 550 miles of road have been surveyed and mapped since April 15, 1888. The company is doing most of the work, employing but few contractors. H. H. Filley, Kansas City, Mo., is Chief Engineer; F. Greene, Colima, is Principal Assistant and Resident Engineer; W. S. Kyle is Superintendent of the Zacatecas division, and R. M. Stadden is Superintendent of the Manzanillo division.

Monterey & Mexican Gulf.—The locating survey is now in progress for that part of the line from Victoria south-east to Tampico, on the Gulf of Mexico. The line is all located to Victoria, in the state of Tamaulipas, a distance of 300 kilometers southeast of Monterey. The grading has been completed on the first 60 kilometers, track is laid on the first

15 kilometers, and over a kilometer of track is being laid a day. As already noted, Carlisle, Price & McGavock, of Pueblo, Col., have the contract for building the road to Victoria, and they have a very large force at work.

Mousam River.—The proposed road from Springvale to Kennebunk, in Maine, a distance of about ten miles, has been incorporated in Maine. The incorporators were given in our issue of Feb. 22 under "New Roads."

Nebraska & Western.—Bids will be received at the office of the Wyoming & Pacific Improvement Co., in the Chamber of Commerce, Sioux City, till April 15, for grading and bridging 100 miles of the Nebraska & Western from Sioux City west. Surveyors are nearly done with the work of final location of this section of road, and active construction work will begin soon.

New Roads.—James E. Taylor, of Cape May, N. J., is interested in a proposed road from Winslow Junction, on the New Jersey Southern through Tuckahoe and Sea Isle City, and thence along the beach resorts to Cape May. Residents along the proposed line will be asked to subscribe \$200,000 of the capital stock.

A project for a road from Middleboro, Mass., through Carver to Plymouth, is being agitated, and committees have been appointed to endeavor to raise funds for a survey of the line. T. D. Shumway, of Plymouth, is one of the projectors.

Robert Dickinson, of New Westminster, B. C., Thomas Dunn, of Vancouver, B. C., and others, have applied for a provincial charter to build a road from New Westminster to Vancouver, seven miles.

New York, Ontario & Western.—The stockholders of the New York, Ontario & Western met this week and approved the new issue of \$10,000,000 fifty year five per cent. bonds, redeemable at 105 after ten years, the proceeds of which are to be used for extension into the coal regions.

Northern Pacific.—It is stated that the Central Washington branch, which was built last year from Cheney, west to Davenport, W. T., 41 miles, will be continued west this year from Davenport to Waterville, Douglas County, nearly 100 miles. Waterville is near the Columbia River, a few miles above the junction of the Wenatchee River. If this line was continued west to Cle Elum, it would there join the main line to Tacoma, and would save the present long detour to the south to Pasco, which is made after leaving Spokane Falls.

Northern Pacific & Manitoba.—The company will let contracts this month for building the line from Morris to Brandon, Ont., a distance of 140 miles. This line has been nearly all located, and some work has already been done on it. Work is in progress on the line from Winnipeg northeast to Portage La Prairie, Man., 52 miles, and about 15 miles of track has been laid.

Owensboro, Falls of Rough & Green River.—The company last week executed a mortgage of \$560,000 to the Holland Trust Co., of New York, and the grading will begin at once at Owensboro, Ky., working southeast to Litchfield, passing through Fordsville.

Peru & Detroit.—The company has been incorporated in Indiana to construct a line 25 miles in length from Peru northeast to Laketon connecting there with the Wabash Western at that point.

Polk & Forty-ninth Street Junction.—This company, whose incorporation was noted last week, proposes to construct a road from the Junction, on the Grand Trunk Junction Railway, with the Chicago & Western Indiana road, from Forty-Ninth street north along the line of the last-named road to Polk street.

Port Jervis, Monticello & New York.—The branch from Huguenot to Summitville, 18 miles, was opened to passenger travel April 1. The extension gives Port Jervis and Monticello connection with the New York, Ontario & Western. The company now operates 42 miles of road from Port Jervis to Summitville, N. Y.

Port Townsend Southern.—Payne Bros., of Port Townsend, W. T., have been awarded the contract for building the first six miles from Port Townsend, W. T., south. Work will commence this week. The contract will be let for the next section of 19 miles within 30 days. The bidders on the work were McDonald & Co., Kern Bros., of Fall City; Earle & Co., of Seattle; Terry & McDougall and Payne Bros., Port Townsend; J. J. Elliott & Co., Thos. Moran & Co., Ritchy & Co., H. F. Phillips, of Seattle; W. C. Williams, of Port Townsend; W. W. White, Chas. Lee, of Enumclaw, and Keating, Graham & Co.

Fort Worth & Rio Grande.—The contract for building 60 miles of the extension from Granbury, Tex., to the Colorado River, has been awarded to Hurley, Tierney & Lynch. The work is to commence within 10 days and be completed early in the fall. This contract will bring the road through Stephenville to a point in Erath County, near the Houston & Texas Central. This extension has been surveyed to the Colorado River, 135 miles from Granbury.

Richmond & Danville.—The contract for tracklaying the High Point, Randleman, Asheboro & Southern Road, has been awarded to the Greystone Granite Construction Co., of Henderson, N. C.

Richmond, Fredericksburg & Potomac.—The contract has been let to F. W. Harmon & Co. for grading the eight mile line near Richmond, connecting this road with the Richmond & Petersburg.

St. Louis & San Francisco.—The directors have declared a dividend of 1 per cent. on the preferred stock, payable April 15. The dividend is for the three months ended March 31, at the rate of 4 per cent. a year. The dividend was declared from the surplus earnings of former years (estimated at about \$3,700,000), a large part of which is in cash. The board voted to make future payments of the dividends quarterly instead of semi-annually, as has been the case heretofore. The former rate of dividend has been 5 per cent. per annum. The company has no floating debt and no contracts for unfinished construction work or rolling stock.

San Antonio & Aransas Pass.—About a year ago, this company agreed to extend its road northwest through Luling and Lockhart to Austin, Tex., on condition that the right of way and certain subscriptions were granted. These conditions were soon complied with, but since then the company has done no active construction on the line, and the subscriptions have now become void. The company has, however, now agreed to complete the road to Lockhart, by Sept. 1, and to Austin by Jan. 1, 1890, if the agreements are renewed. The company states that it has under contract a bridge to be built over the Colorado River, to cost \$100,000.

San Diego, Cuyamaca & Eastern.—This road is now completed from San Diego to Lakeside, Cal., a distance of 22 miles, and it is thought that work will soon be commenced on the line from Lakeside northeast to Salton, on the Southern Pacific, about 110 miles, the surveys for which have been made.

Schuylkill & Lehigh Valley.—A bill in equity has been filed by the Philadelphia & Reading in the Pottsville courts against this projected road, and an injunction will be asked for restraining it from building a road upon the line staked out. The bill sets forth that the Schuylkill Haven & Lehigh River, popularly known as the Lizard Creek road, began to build a road during the war and spent \$250,000 in grading its line. The road was leased to the Mine Hill, which in turn was leased to the Reading in 1864. The projected road was never completed, but it is claimed that all its franchises are vested in the Mine Hill. The Schuylkill & Lehigh Valley has located its line upon the very ground bought and graded by the old Lizard Creek road, and proposes to mortgage the property for \$1,000,000 to provide funds to build the road. It is to this mortgage that the Philadelphia & Reading objects, on the ground that it will tend to cloud the title of the old company.

Selma & Cahaba Valley.—The company expects to complete the arrangements for building its road this or next month, and to then let the contracts for building it. The line has been surveyed from Selma, through the Cahaba Valley to Bessemer, Ala., about 80 miles. E. G. Gregory, of Selma, Ala., is President.

Shreveport & Texarkana.—This company has been chartered in Louisiana with a capital stock of \$1,500,000, to build a road from Shreveport to the Arkansas state line, to connect with a road to be built to that point by the Texarkana & Shreveport. R. T. Cole, John R. Jones and others are directors.

Silverton.—New surveys will be made, as soon as the weather permits, from Ironton, north to Ouray, Col., about 12 miles, and for the branch from Silverton northeast to Eureka, about 10 miles. The road is now completed from Silverton to near Ironton. C. W. Gibbs, of Silverton, Col., is Chief Engineer.

South Carolina.—The announcement is made that the directors of the road have made arrangements with the Central Trust Co., of New York, to meet the interest accruing April 1, on the first mortgage bonds.

South Ontario & Pacific.—The railway committee of Canada have passed the bill extending the time for the completion of this road for five years from date. It is stated that the company has been merged with the Port Arthur, Duluth & Western.

Springfield & Claremont.—The surveys of this line, which is projected to connect the Rutland road from a point near Gassetts, Vt., with the Sullivan County road at Claremont, N. H., have been completed and maps and estimates of the road are now being prepared.

Suncook Valley.—The locating survey for the extension of this New Hampshire road from its present terminus, at Pittsfield, north to Alton Bay, has been completed as far as Barnstead Centre, and the preliminary survey has been finished to Alton Bay. The capital stock issued to provide funds for the extension has been subscribed, and the contract will soon be let, and work commenced. The greatest grade will be 35 ft. to the mile. When completed the extension will be operated by the Concord road. John J. Bell, of Exeter, N. H., is President.

Tacoma, Olympia & Chehalis Valley.—Contracts have been let for building the first 10 miles of this road west from Centralia, Wash. Ter., on the Northern Pacific. The survey has been made from Centralia, just north of Chehalis, northwest, a distance of 80 miles to Gray's Harbor, on the Pacific Coast. W. B. Allen, of Tacoma, is Secretary.

Tacoma Terminal Co.—A charter has been filed at Tacoma for this company by officers of the Northern Pacific. The company will construct the terminal improvements of the Northern Pacific road in Tacoma. The articles are very voluminous. They cover the purchase, improving, mortgaging and selling lands in Tacoma and elsewhere in the Territory of Washington, the construction and operation upon its own or leased property of elevators, warehouses, freight and station buildings, machine shops, round-houses, docks, bridges, coal and ore bunkers, railroad tracks and switches; the building upon Commencement Bay and the waters of Puget Sound of boats and vessels; the buying and selling of stocks and other securities of other corporations. The amount of capital stock is placed at \$1,000,000.

Tennessee Midland.—The annual report of the President states that the line was opened for business between Memphis and Jackson June 1, 1888. The work of construction between Jackson and the Tennessee River has proceeded rapidly. The line was opened for traffic through Madison County, Jan. 1, 1889, to Lexington Feb. 4, and through Henderson County Feb. 27. It is expected that trains can be run to Parsons, within the next 15 days, and that the whole line can be put in operation through to the Tennessee River in May. From Memphis to within 10 miles of Nashville the rights of way had been practically secured, and grounds for terminal facilities in Memphis and for depots at Somerville and Jackson had been secured. The present equipment of the road consists of 4 10-wheel freight locomotives, 3 8-wheel passenger locomotives, 3 first-class passenger cars, 3 baggage and express cars, and over 100 freight cars.

Utah & Colorado.—The reorganization committee of the Denver & Rio Grande Western have formulated a plan for the reorganization of the company into a new company to be called the Utah & Colorado, to succeed to the rights now owned by the Denver & Rio Grande Western, and to acquire and possess such other rights as shall be necessary to carry out the plan. It is proposed to issue new first-trust mortgage 4 per cent. 50-year gold bonds to the amount of \$16,000,000, which will be supplied as follows: \$6,900,000 to the holders of present first mortgage bonds in exchange therefor; \$7,700,000 to widen the gauge, provide rolling stock and build extensions; \$1,400,000 shall be kept as a capital reserve, only to be issued against new lines at a rate that will not, under this mortgage, impose an annual charge exceeding \$1,000 per mile thereof. Also, to issue \$7,500,000 preferred stock to be used as follows: \$4,140,000 shall be distributed pro rata to holders of present bonds, to compensate for the reduction in interest and to represent the coupon certificate belonging to each bond, being at the rate of \$600 to each present bond. \$3,360,000, except as may be otherwise appropriated by the committee to carry out this plan, shall be held in the treasury of the company as a capital reserve. Common stock not exceeding \$7,500,000 will be issued and exchanged for present common stock dollar for dollar. Under the plan the interest charge would be \$640,000 per year, and the new mortgage will contain provisions that in case of default in the payment of interest in whole or in part, the mortgage trustees, or in case they do not act, a majority of the bondholders, shall have the right to nominate and have elected a majority of all the directors of the company, thus providing a remedy, avoiding, if they so desire, the delay, expense and uncertainties attending receiverships, foreclosure, and litigation.

Virginia & Kentucky.—A full force of engineers will begin work on the mountain division of this road, referred

to last week, as soon as preliminary arrangements are completed. The line is a western extension of the Danville & New River, reaching towards the coal fields of southwest Virginia, and in connection with the Atlantic & Danville will eventually constitute a through line from Norfolk, Va., to the Ohio River. David S. Pierce is President and J. C. Wrenshall, of Danville, Va., is Chief Engineer and General Manager.

Western Counties.—The Dominion Government has announced in Parliament its intention of immediately commencing the construction of the link in this road between Digby and Annapolis, N. S., some 18 miles in length. This will give a continuous line from Halifax to Yarmouth. Bids for building the line have been called for.

Winona & Southwestern.—Near Bear Creek, Minn., the present end of track on this road, there will be five miles of heavy work. Two tunnels will be built, 1,825 ft. and 475 ft. long respectively. There will also be three iron viaducts from 100 to 145 ft. in height and considerable rock work. The company has just completed the location of a switch-back 2½ miles long which will have 4 per cent. grades and will enable the company to get over the hills, while the heavy work is being done, thus enabling it to go on with the work beyond the tunnels much more rapidly than could otherwise be done.

The location for the line has been completed for the first 45 miles, and several preliminary lines have been run to Mason City, Ia., about 135 miles from Winona. It has not yet been decided when contracts will be let for the extension of the road from its present terminus. D. M. Wheeler, of Winona, is Chief Engineer and Superintendent.

Wyoming, Salt Lake & California.—The Summit County Railroad & Transportation Co. has filed amended articles of incorporation in Utah. The company's name is changed to Wyoming, Salt Lake & California. The capital stock is made \$4,000,000. The cost of the road, right-of-way, motive power, appurtenances and construction is put at \$1,500,000. The line is to be operated from Salt Lake City through the Wasatch Mountains via Emigration Canon to Coalville; thence by established lines to the Wyoming line, 86 miles. It will pass through a large and valuable coal vein. The road will have a branch to Park City, and intersect road approaching Salt Lake from the south and west. Its western terminus is the Salt Lake, Nevada & California, on which there are now two outfits grading beyond Salt Lake toward Lake Point, and the line is surveyed to Deep Creek. The officers are given in another column.

Zealand Valley.—The company expects to begin work about May 1 on an extension from the present terminus south of Zealand Notch to Thompson's Falls, N. H., about 2½ miles distant. It is expected to complete the line by July 1.

TRAFFIC AND EARNINGS.

Traffic Notes.

The roads in the Central Traffic Association will make round trip excursion rates to New York City on the occasion of the Centennial celebration of Washington's inaugural, April 30, at the first-class limited one way fare plus \$2.

The Chicago & Alton and the Chicago, Burlington & Quincy have announced their intention to reduce the rate on lumber from Chicago to Missouri River points from 16 to 10 cents per 100 lbs. The rate will not go into effect until after it is passed upon at a meeting of the Western Freight Association next week. It is said that the Chicago & Alton insists on this reduction on account of the competition of yellow pine lumber from Southern points.

A number of Chicago roads have agreed to hereafter pay ticket agents at hotels who sell their tickets, by salary instead of commissions, and an agreement has been entered into fixing the salaries at the Palmer House Grand Pacific and Tremont House, to be paid jointly by the roads.

The lake and rail lines began quoting rates at Chicago last week on flour, grain and provisions to New York. The rate on corn per bushel was 8½ cents. Independent steamers and vessels will no doubt go considerably below this rate. It is reported that charters for corn have already been made at 2½ cents per bushel, Chicago to Buffalo. Lake navigation has now been formally opened, and the first vessel of the season loaded with corn cleared from Chicago for Buffalo April 1.

The New York Central announces reduced rates for the transportation of parties of ten or more on a plan similar to that adopted by the Pennsylvania recently. Ten or more persons traveling on a single ticket will be charged only 80 per cent. of the regular fare. From New York City to Buffalo this will be \$7.40, which is equal to 1.685 cents per mile. It is not stated whether these tickets will be on sale at all stations.

The Chesapeake & Ohio brought its first train load of coal to Cincinnati last week. There were 41 cars in the train, all of them decorated with flags. The coal was from the Big Sandy region.

Forty-five roads were represented at the mass meeting of general passenger agents at Cincinnati, April 2. It was declared as the sense of the meeting, by a vote of 25 to 18, that second class rates should not be abolished. The Inter-state Commerce Commission's ruling on joint rate sheets was held to practically approve of present methods. The representatives of the roads forming the Central Traffic Association met later and concurred in the action in regard to second class rates. They also confirmed former action protesting against the Baltimore & Ohio's course in taking a differential rate for itself from Cincinnati and Chicago to New York as forming a dangerous precedent.

Inter-state Commerce Commission.

An opinion was filed March 30 by Commissioner Walker containing the results reached in the investigation of the tariffs and classifications of the railroads operating in the Southern states which was held by the Commission in December last. It appears that upon many of the lines considerable changes have been made since the passage of the act to regulate commerce.

The tariffs of the Chesapeake & Ohio in the state of Virginia do not violate the strict rules of the short-haul section; the tariffs of the Norfolk & Western also conform to the short-haul rule with a single exception, namely, tariffs from the Western and Southern states to points on the line of this road in Virginia; tariffs of the Richmond & Danville and its associate lines have also been brought quite generally into harmony with the rule of the law. Some exceptions remain which are described, and the grounds on which the company claims to justify the same are given. The same is true of the Cincinnati, New Orleans & Texas Pacific. The tariffs of the East Tennessee, Virginia & Georgia are treated at considerable length. The changes which have been made in the direction of conformity to the law are pointed out, together with other changes, which seem to be required, both in the matter of classification and in respect to the construction of tariffs. The condition of the tariffs of the Louisville & Nashville at the time of the hearing had not been materially changed

since the passage of the law. The results brought out are given at considerable length and are criticised in many respects. It appears, however, that new tariffs were filed by this road last week, in which the entire system was changed, its local classification surrendered, and new schedules prepared which are substantially in conformity to the requirements of section six of the act. The tariffs also show changes on the main line and on many of the branches in the direction of conformity to section four. Changes made by the Central of Georgia are also described, and an effort made on the part of that company to bring its methods into more apparent conformity to the law is observed.

Upon the whole, it is the conclusion of the Commission that, so far as the introduction and application of the short-haul rule has extended in the Southern States, the evils which were anticipated have not been found to exist, and that the relations between the carriers and their patrons in some sections of the country have been materially improved.

The order of the Commission is that the carriers named in the order of notice comply with the statute in the particulars and respects pointed out without unnecessary delay, and make reports to the Commission of their action in the premises. If the action so reported shall seem to fall short of what is required by the law, further action will be taken.

Posting Joint Rate Sheets.

The following is from the decision of the Inter-state Commerce Commission on the questions presented by the Western States Passenger Association, at the recent conference.

One general passenger agent inquired:

"What may be done to accommodate individuals in the way of supplying through tickets at through rates from stations at which such through tickets are not usually on sale, and at which the small business does not warrant the keeping a stock of tickets, and at which the joint through rates are not quoted?"

This question does not seem to the Commission to present a point of difficulty. Every carrier has its regular local rates to and from every point on its line, and it is supplied with the rate sheets of connecting lines. If from any one of the stations it unites in no joint rate to a station on another line to which a ticket is applied for, it is always competent to give a rate made up of the sums of rates prevailing on the several roads or parts of roads which must be made use of in the journey—the local rates where there are no joint rates, and the joint rates where joint rates less than the sum of the locals are established for any part of the distance. Thus, if the ticket were desired from an insignificant station on the Michigan Central to another equally insignificant in Texas, the through rate might be made up, perhaps, of the local rate to Chicago, a joint rate from Chicago to Memphis or New Orleans or Galveston, and a local from thence to the point of destination. There would be nothing illegal in making a through rate in that way for any individual traveler, or in giving a ticket or checking baggage for the whole journey with the consent of the several lines; on the contrary, it would subserve the public convenience. It has been customary for the carriers to do this in the past, and we have no idea the act to regulate commerce was intended to preclude its being done hereafter.

In this view the Commission has announced that it would be understood, when no other joint rates are announced, that the local rates are employed in arriving at the through rate. No requirement of posting existing joint tariffs has as yet been made. The requirement is that when changes are made the advance or reduction shall be notified to the Commission, and made public as required by the law. A new individual or joint passenger tariff must be posted at the stations to which it applies, and tickets can be sold on combination of initial or terminal locals therewith, in the same manner as heretofore.

Kansas Freight Rates.

The Kansas Railroad Commissioners have issued an order on application of the Mayor and Board of Trade of Wichita directing a reduction of local freight rates between that city and its surrounding towns. The roads are required to give the same rates west and south of Wichita and for 75 miles east of Wichita, as are now in force for similar distances from the Missouri River. Merchandise rates take effect sixty days hence, and live stock rates within thirty days.

Ticket Commissions.

A Chicago dispatch of April 2 states that the following memoranda of resolutions was recently adopted by the managers as part of the "confidential" records of the Western States Passenger Association and has been transmitted by Chairman Abbott to the various association roads to be included in the proceedings, but not for other distribution: "Resolved, that any road shall have the right to sell orders for its tickets along the lines of connecting roads that refuse to sell its tickets, and may pay a commission for the sale of such orders. No orders for tickets shall be sold by any other road or at any other point except upon five days' notice through the chairman, and nothing in this rule shall be construed as authority for any road to pay, or as binding it not to pay, commissions to the agents of any road that objects to the payment of commissions to its agents."

St. Paul-Chicago Rates.

It is stated that the rate on flour, which was recently reduced from 12½ to 7½ cents per 100 lbs. between St. Paul and Chicago, on business destined to Eastern points, is to be advanced again, the Chicago, Burlington & Northern, which led the reduction, having entered into an agreement with the Soo and Lake Superior lines to advance the rate to ten cents on April 15.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, March 30, amounted to 50,974 tons, against 55,696 tons during the preceding week, an increase of 1,278 tons, and against 48,091 tons during the corresponding week of 1888, an increase of 8,883 tons. The proportions carried by each road were:

	W'k to Mar. 30.		W'k to Mar. 23.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	5,657	9.9	4,924	8.9
Wabash.....	4,549	8.0	4,846	8.7
Lake Shore & Michigan South.	6,559	11.7	5,212	9.4
Pitts., Ft. Wayne & Chicago.	5,766	10.1	5,940	10.7
Chicago, St. Louis & Pitts.....	6,325	11.1	6,130	11.0
Baltimore & Ohio.....	2,979	5.2	3,271	5.9
Chicago & Grand Trunk.....	13,518	23.8	13,250	23.8
New York, Chic. & St. Louis.....	4,633	8.1	4,443	7.8
Chicago & Atlantic.....	6,888	12.1	7,670	13.8
Total.....	56,974	100.0	55,696	100.0

Of the above shipments 3,450 tons were flour, 28,338 tons grain, 2,493 tons millstuffs, 3,481 tons cured meats, 1,427 tons lard, 7,413 tons dressed beef, 1,894 tons grass seed, 865 tons butter, 1,250 tons hides, 127 tons wool, and 4,408 tons lumber. The three Vanderbilt lines carried 29.7 per cent. of all the shipments, while the two Pennsylvania lines carried 21.1 per cent.